



BENGALLA MINE

MINING OPERATIONS PLAN

2017-2021

(Amendment B)

SSD- 5170 (as modified)



Application Date: [May 2020](#)


Name of Mine:	Bengalla Mine
MOP Commencement Date:	1 st January 2017
MOP Completion Date:	31 st December 2021
Mining Authorisations (Lease/License No.):	ML1397, ML1469, ML1450, ML1711, ML1728, ML1729, ML1645 Sublease 1, ML1645 Sublease 3, ML1645 Sublease 4
Name of Authorisation/Title Holder(s):	ML1397 Bengalla Mining Company Pty Limited ML1469 Bengalla Mining Company Pty Limited ML1450 Bengalla Mining Company Pty Limited ML1711 Bengalla Mining Company Pty Limited ML1728 Bengalla Mining Company Pty Limited ML1729 Bengalla Mining Company Pty Limited ML1645 Sublease1 Bengalla Mining Company Pty Limited ML1645 Sublease3 Bengalla Mining Company Pty Limited ML1645 Sublease4 Bengalla Mining Company Pty Limited
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Title of Representative(s) of the Authorisation Holder(s):	General Manager
Signature of Representative(s) of the Authorisation Holder(s):	 20-07-2020
Date:	20/07/2020
Version:	Original – Black Amendment A – Red Amendment B - Blue

Table of Contents

Table of Contents	3
List of Tables	5
List of Figures	5
1 Introduction	6
1.1 History of Operations	8
1.2 Consents, Authorisations and Licences	12
1.3 Environmental Management System	14
1.4 Land Ownership and Land Use	14
1.5 Stakeholder Consultation	16
1.5.1 Community Consultative Committee	17
1.5.2 Statutory Authorities	17
1.5.3 Rehabilitation Management Plan	17
1.5.4 SSD-5170 Modification 4	18
1.5.5 Rehabilitation and Post-Mining Land use	18
2 Proposed Mining Activities	19
2.1 Project Description	19
2.2 Asset Register	19
2.3 Activities over the MOP Term	22
2.3.1 Geology and Exploration	22
2.3.2 Construction	23
2.3.3 Mining Operations (including mining purposes)	24
2.3.4 Rock/Overburden Emplacement	28
2.3.5 Processing Residues and Tailings	29
2.3.6 Waste Management	29
2.3.7 Decommissioning and Demolition Activities	30
2.3.8 Progressive Rehabilitation and Completion	30
2.3.9 Material Production Schedule During MOP Term	30
3 Environmental Issues Management	31
3.1 Environmental Risk Assessment	31
3.2 Environmental Risk Management	34
3.2.1 Environmental Management Documents	34
3.2.2 Specific Risks relating to Rehabilitation	36
4 Post Mining Land Use	43
4.1 Regulatory Requirements	43
4.2 Rehabilitation Management Plan Requirements	47
4.3 Post Mining Land Use Goals	49
4.4 Rehabilitation Objectives	50
4.5 Community Issues associated with Mine Closure	50
5 Rehabilitation Planning	51
5.1 Domain Selection	51
5.1.1 Primary Domains	52
5.1.2 Secondary Domains	53
5.2 Domain Rehabilitation Objectives	54
5.3 Rehabilitation Phases	56
5.3.1 Decommissioning	56
5.3.2 Landform Establishment	56
5.3.3 Growth Medium Development	56
5.3.4 Ecosystem and Land-use Establishment	56
5.3.5 Ecosystem and Land-use Sustainability	56
5.3.6 Relinquishment	57
5.3.7 Rehabilitation Phases at the end of the MOP	57
6 Performance Indicators and Completion Criteria	58
6.1 Completion Criteria	58

7	Rehabilitation Implementation	74
7.1	Status at MOP Commencement	74
7.2	Proposed Rehabilitation Activities during the MOP Term	75
7.2.1	Ground Disturbance	75
7.2.2	Landform Establishment	75
7.2.3	Growth Medium Development	76
7.2.4	Ecosystem and Land-Use Establishment	76
7.2.5	Rehabilitation Monitoring and Maintenance	80
7.2.6	Disturbance and Rehabilitation Progression during the term of the MOP	80
7.3	Summary of Rehabilitation Areas during the MOP Term	81
7.4	Relinquishment phase achieved during MOP Period	85
8	Rehabilitation Monitoring	86
8.1	Transect-based Monitoring	86
8.1.1	Monitoring Transects	86
8.2	Rehabilitation Audit	90
8.2.1	Audit Methodology	90
8.2.2	Audit Frequency and Study Area	90
8.3	Reporting	91
9	Research Programs and Analogue Sites	92
9.1.1	Biochar – Soil Carbon Project	92
9.1.2	Analogue Sites	92
9.1.3	Grazing Trials on Rehabilitated Lands	93
9.1.4	Revegetation Trials	93
9.1.5	Species Suitability Trials	93
9.1.6	Weed Control Trials on Rehabilitated Lands	94
9.1.7	Tailings to Topsoil	94
10	Intervention and Adaptive Management	95
10.1	Threats to Rehabilitation	95
10.2	Trigger Action Response Plan	95
11	Reporting	105
11.1	Annual Review	105
11.2	Auditing	105
11.3	Rehabilitation Plan Review	106
11.4	Reporting an Incident	106
11.5	Complaints	106
11.6	Continuous Improvement	106
12	Rehabilitation Maps	107
	Plan 1A - Pre Mining Environment – Project Locality	108
	Plan 1B - Pre Mining Environment – Natural Environment	110
	Plan 1C - Pre Mining Environment – Built Environment	112
	Plan 2 - Mine Domains at Commencement of MOP	114
	Plan 3A - Mining and Rehabilitation – 2017	116
	Plan 3B - Mining and Rehabilitation – 2018	118
	Plan 3C - Mining and Rehabilitation – 2019	120
	Plan 3D - Mining and Rehabilitation – 2020	122
	Plan 3E - Mining and Rehabilitation – 2021	124
	Plan 4 - Final Rehabilitation and Post Mining Land use	126
	Plan 5 - Rehabilitation and Post Mining Land use Cross Sections	128
13	Review and Implementation of the MOP	130
13.1	Review of the MOP	130
13.2	Implementation	130
14	References	131
15	Acronyms	132

List of Tables

Table 1: History of Approvals	8
Table 2: Consents, Leases and Licences	12
Table 3: Stakeholder Comments on MOP Amendment B	17
Table 4: Project components	19
Table 5: Major assets by domain	20
Table 6: Material Production Schedule during the MOP Term	30
Table 7: Risk Likelihood Ratings	31
Table 8: Maximum Reasonable Consequence Ratings	31
Table 9: Risk matrix	32
Table 10: Risk Classifications	32
Table 11: Environmental Risk Assessment	33
Table 12: Environmental Management Documents	35
Table 13: Mining Lease Requirements	43
Table 14: Development Consent Requirements for Rehabilitation	47
Table 15: Bengalla Primary and Secondary Domains	51
Table 16: Rehabilitation Objectives	54
Table 17: Summary of rehabilitation phases proposed for completion at the end of the MOP	57
Table 18: Decommissioning Phase	59
Table 19: Landform Establishment	60
Table 20: Growing Media Development	63
Table 21: Ecosystem and Land Use Establishment	65
Table 22: Ecosystem and Land use Sustainability	69
Table 23: Land Relinquishment	73
Table 24: Rehabilitation Status of Bengalla defined Domains	74
Table 25 Pasture Rehabilitation Species	77
Table 26 Direct Seeding mix – High Density Woody Vegetation	78
Table 27 Seeding Mix – Swales	79
Table 28: Disturbance and Rehabilitation Progression during the term of the MOP	80
Table 29: Rehabilitation Data Table	82
Table 30: Rehabilitation Monitoring Program Study Transects	87
Table 31: Rehabilitation Monitoring Program Methodology	88
Table 32: Analysis of Rehabilitation Threats	96
Table 33: Trigger Action Response Plan	98
Table 34: Responsibilities for implementation of the MOP	130

List of Figures

Figure 1: Land Ownership Plan	15
Figure 2: SSD-5170 Modification 4 Statement of Environmental Effects section 4	18
Figure 3: Schematic of Bengalla's Mining Sequence	25
Figure 4: Concept example of Geofluv landform.	76
Figure 5: Monitoring transect layout	87

1 Introduction

Bengalla Mine (Bengalla) is located in the Upper Hunter Valley of New South Wales (NSW), approximately 130 kilometres north-west of Newcastle and four kilometres west of Muswellbrook. Bengalla is bound by Wybong Road to the north, Overton Ridge to the east, the Muswellbrook-Ulan Rail Line and the Hunter River Flood plain to the south and Roxburgh Road to the west.

Bengalla is managed by Bengalla Mining Company Pty Limited (BMC), and the Bengalla Joint Venture (BJV) owns the exploration and mining rights within the Bengalla Mining Leases. The current participants and their interests in the BJV are as follows:

- New Hope Bengalla Pty Limited 80 per cent.
- Taipower Bengalla Pty Limited 20 per cent.

In September 2013, the *Continuation of Bengalla Mine Environmental Impact Statement* (BMC, 2013), as modified by the Response to Submissions (BMC RTS 2014) (together **Bengalla EIS**) was prepared to support an Application for Development Consent to enable continued mining operations at Bengalla. On 3 March 2015, the Secretary of the Department of Planning and Environment (now the [Department of Planning, Industry and Environment \(DPIE\)](#)) granted SSD-5170 which permits, but not restricted to the following activities at Bengalla:

- Continuation of open cut mining towards the west at a rate of up to 15 Million tonnes per annum run of mine coal until 2039.
- Continued use of the existing dragline, truck fleet and excavator.
- An out of pit Overburden Emplacement Area (OEA) to the west of Dry Creek which may be utilised for excess spoil material until it is intercepted by mining.
- Various upgrades, relocations or additional new infrastructure to support the Project.
- Processing, handling and transportation of coal via the (upgraded) Coal Handling and Preparation Plant (CHPP) and rail loop for export and domestic sale.
- Continued rejects and tailings co-disposal in the Main OEA and temporary in pit reject emplacement.
- Relocation of a 6 km section of Bengalla Link Road at approximately Year 15 near the existing mine access road to facilitate coal extraction.
- The diversion of Dry Creek via dams and pipe work with a later permanent alignment of Dry Creek through rehabilitation areas when emplacement areas are suitably advanced.
- Relocation of water storage infrastructure as mining progresses through existing dams (including the Staged Discharge Dam and raw water dam).
- A workforce of approximately 900 full time equivalent personnel (plus contractors) at peak production.

SSD-5170 Modification 1 was modified on the 16th of December 2015 for activities described in **Statement of Environmental Effects dated August 2015 including the Response to Submissions document dated October 2015 (together MOD 1 SEE)**, to seek modifications for the following:

- Alterations to various water management infrastructure components including:
 - Utilisation of the Satellite Pit as a temporary dirty water catchment dam.
 - Relocation of the Staged Discharge Dam (SDD) Hunter River Salinity Trading Scheme (HRSTS) staged discharge release point.
 - Construction of clean water diversion levees in locations other than those already approved.

- Revised locations for the proposed relocation of the Hunter River and Washery Dams.
- Additional locations for the siting of the Explosives Storage Facility.
- The placement of fill from the excavation of clean Water Dam 1 adjacent to it.

SSD-5170 was further modified on 1 July 2016 by the Director – Resource Assessments for the [DPIE](#) as delegate of the Minister for Planning for the activities largely described in the ‘Bengalla Mine Development Consent Modification Statement of Environmental Effects [dated April 2016 including the Response to Submissions document dated June 2016 \(together MOD 2 SEE\)](#). The MOD 2 SEE provides approval for the following:

- Alterations to the approved height of the Main OEA to improve visual amenity from primary viewing locations in and surrounding the township of Muswellbrook and Denman Road, in two selected locations (Visual Relief Areas):
 - The Northern Relief Area constructed to a maximum height of Reduced Level (RL) 300.
 - The Southern Relief Area constructed to a maximum height of RL 290.
- Establishment of a new gravel access road from Wybong Road to the Dry Creek Diversion Project Construction Site Office being a former homestead (Homestead Access).

SSD-5170 was modified on the 23rd December 2016 for activities described in ‘Development Consent Modification 3 Statement of Environmental Effects’ [dated September 2016 including the Response to Submissions November 2016 \(together MOD 3 SEE\)](#). MOD 3 facilitates adjustments to the positioning of the following approved activities:

- The construction and operation of an explosives facility and reload facility.
- The alignment of the Hunter River pipeline.
- The emplacement and use of temporary topsoil stockpiles during the mining process.

[SSD-5170 was modified on 19th December 2018, for activities described in ‘Development Consent Modification 4 Statement of Environmental Effects’ dated December 2017 including the Response to Submissions document dated May 2018 and additional information dated July 2018 and November 2018 \(together MOD 4 SEE\)](#). MOD 4 facilitates following approved activities:

- [Changes to the approved water management system to reflect operations at Bengalla including proposed enlargement of the approved Staged Discharge Dam \(ED1\), and construction and use of the Dry Creek East Dam.](#)
- [Temporary storage of approximately 2,500 m3 of excess materials from the construction of ED1.](#)
- [Increase in the capacity and additional locations of ROM coal stockpiles.](#)
- [Additional storage locations for temporary emplacement of coal processing reject material, prior to permanent emplacement.](#)
- [Temporary clay emplacement within the Main OEA or to the west of this for later use in the reinstatement of Dry Creek.](#)

This Mining Operations Plan (MOP) [Amendment B](#) is for a period of 5 years through to 31st December 2021, (noting Year 1 starts from 1st January 2017).

Further, it includes the requirements of SSD5170 Schedule 3, Condition 46 Rehabilitation Management Plan (RMP) as requested by Department of Industry – Division of Resources and [Geoscience \(now the Department of Planning, Industry and Environment Resources Regulator \(DPIE-RR\)\)](#). This MOP has been prepared in accordance with the following guidelines and standards:

- ESG3: Mining Operations Plan (MOP) Guidelines, September 2013.

- Strategic Framework for Mine Closure (Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia, 2000).
- Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry (Department of Industry, Tourism and Resources [DITR], 2006a).
- Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry (DITR, 2006b).
- A Rehabilitation Manual for Australian Streams (Rutherford et al., 2000).

A Rehabilitation Cost Estimate (RCE) has been provided as part of the application.

Where variations from this plan are required to comply with relevant environmental instruments then those variations will be implemented which may result in departures from this plan to enable compliance.

A copy of the Bengalla Mine SSD-5170 as modified can be found on DPIE's website at http://majorprojects.planning.nsw.gov.au/page/project-sectors/mining--petroleum--extractive-industries/mining/?action=view_job&job_id=7608

1.1 History of Operations

A brief history of development, mining and associated approvals for Bengalla is provided in Table 1.

Table 1: History of Approvals

Year	Details
1995	Original Development Consent DA211/93 BMC was granted DA 211/93 under the Environmental Planning and Assessment Act 1979 (EP&A Act) for the 'Construction and operation of a surface coal mine, coal preparation plant, rail loop, loading facilities and associated facilities' on 7 August 1995. The supporting document to the Development Consent is the Bengalla Environmental Impact Statement (Original EIS).
1998	Original MOP In July 1998 Bengalla submitted its first MOP. This MOP detailed the mining operations and rehabilitation to be undertaken by Bengalla through to December 2003. The plan was subsequently approved on 1 December 1998 (MOP 1998).
1999	MOP Amendment A Further detail design work on the rehabilitation profile led to the submission of an amendment to the MOP (MOP 1998) in May 1999 seeking a minor modification to the final rehabilitation profile. The amendment was approved by DMR in July 1999 (MOP 1999).

Year	Details
2001	<p>MOP Amendment B</p> <p>A second amendment was sought in June 2001 relating to a change in a haul road location requiring an increase in the disturbed area to the West. The amendment reduced both visual intrusion and noise impacts on local residents and neighbours as well as increasing the efficiency of and extending the life of the haul road. The DMR granted approval for this amendment in July 2001 (MOP 2001).</p>
2003	<p>MOP Amendment C</p> <p>A third amendment was sought in April 2003 in relation to three changes to the mining operations. These changes were an increase of 90 metres to the West of the extraction limit, provision of a hardstand area and bring forward the closure of the centre ramp and Northern loop roads (MOP 2003). This amendment was approved in May 2003.</p>
2004	<p>MOP (2004-2006)</p> <p>In December 2003 Bengalla submitted a new MOP to allow mining operations to continue until December 2006. THE DMR approved the plan in March 2004 (MOP 2004).</p>
2006	<p>Development Consent Modification 1</p> <p>In March 2006 Bengalla lodged an application for a modification to the current development consent. The supporting document to DA 211/93 (M1) is the Bengalla SEE. Approval for Modification 1 was received on 9 November 2006 (DA 211/93 (M1)).</p>
2006	<p>MOP Amendment A</p> <p>A MOP Amendment was sought to allow Bengalla to implement changes prior to the approval of the next MOP application following the granting of Modification 1 of the development consent.</p>
2006	<p>MOP (2006-2012)</p> <p>In September 2006 a new MOP was submitted to allow Bengalla to continue mining operations until 2012. This MOP was approved in December 2006.</p>
2007	<p>MOP amendment A</p> <p>In March 2007 an amendment was sought for the relocation of the explosives compound to facilitate the progression of mining activities in the main pit in the westerly direction. This amendment was approved in June 2007 (MOP 2007).</p>
2007	<p>Development Consent Modification 2</p> <p>In July 2007 a second modification to the development consent was sought to allow the following modifications to Bengalla:</p> <ul style="list-style-type: none"> • Wantana Extension: • Infrastructure Modifications: • In-pit Facilities <p>The supporting document to DA 211/93 (M2) is the Wantana Extension SEE. The above modifications were approved on 6 December 2007 (DA 211/93 (M2)).</p>

Year	Details
2008	<p>Development Consent Modification 3</p> <p>In March 2008 Bengalla sought a third modification to its mining operations which proposed the following:</p> <ul style="list-style-type: none"> • Construction of the Bengalla Link Road Stage 2 on an alternative alignment to that originally approved; and • Deferral of the relocation of the ROM Hopper and associated facilities from its existing location to a site adjacent to the CHPP. <p>The supporting document to DA 211/93 (M3) is the Bengalla EA 2008. DA 211/93 (M3) was approved on 22 July 2008.</p>
2008	<p>MOP Amendment B</p> <p>In December 2008 a MOP amendment was submitted to allow for the changes to mining operations to reflect the Modification 3 approval. This MOP amendment was approved by DPI on 13 January 2009.</p>
2010	<p>Development Consent Modification 4</p> <p>In December 2010 a fourth modification (M4) was sought to facilitate the following changes to Bengalla operations in response to loss of overburden emplacement capacity:</p> <ul style="list-style-type: none"> • Acceleration of mining operations within the Wantana Extension to align these with existing operations; and • Implementation of an overburden emplacement strategy at Bengalla to resolve the overburden emplacement capacity issues. <p>The supporting document to DA 211/93 (M4) is the Bengalla EA 2010. Modification DA 211/93 (M4) was approved on 7 October 2011 by DP&I.</p>
2011	<p>MOP Amendment C</p> <p>In May 2011 Bengalla submitted an amendment to the existing MOP which included a modified MOP plan of the approved temporary out of pit emplacement area (as described in the Bengalla EA 2010). The amendment was approved on 6 May 2011.</p>
2011	<p>MOP Amendment D</p> <p>In December 2011 Bengalla submitted an amendment to the 2008 MOP to allow mining operations to continue in line with the most recent modification approved (M4). The 2011 MOP amendment described mitigation measures for those impacts outlined in the Bengalla EA 2010 and included MOP plan changes. The 2011 MOP amendment was approved on 12 December 2011.</p>
2012	<p>MOP (2013-2015)</p> <p>On 8th November 2012 Bengalla submitted a new MOP (2013-2015) to continue mining under the development consent due the expiry of the previous MOP. The MOP (2013-2015) was approved on the 11th December 2012.</p>
2014	<p>MOP (2013-2015) Amendment A (2014)</p> <p>On the 17th January 2014 Bengalla submitted Amendment A to the MOP (2013-2015) to allow the step up off the remaining Edderton in the north to make the Wynn coal the basal seam. The MOP Amendment A was approved on the 11th February 2014</p>

Year	Details
2014	<p>Development Consent Modification 5</p> <p>In June 2014 a fifth modification (M5) was sought to facilitate the required geotechnical investigations to complete the detailed design of future water management infrastructure. The modification is comprised of the following geotechnical activities;</p> <p>Test pits at three proposed dam locations associated with the relocation of the BMC Discharge Dam, Hunter River Raw Water Dam and Washery Dam</p> <p>Test pits and two boreholes at the site of the proposed Clean Water Diversion Dam; and</p> <p>Test pits along the pipeline alignment from Clean Water Diversion Dam to the clean water discharge point adjacent to the relocated BMC Discharge Dam.</p>
2014	<p>MOP (2015-2017)</p> <p>On the 31st December 2014 Bengalla submitted the MOP (2015-2017) that would facilitate mining to the end of the current Mining Consent through to mine closure if the Bengalla Continuation of Mining Project application was not approved. This MOP was approved on the 17th March 2015</p>
2015	<p>Bengalla Continuation of Mining Project (BCMP) Development Consent</p> <p>On 3 March 2015, the Secretary of DP&E granted SSD-5170 for the BCMP.</p>
2015	<p>MOP (2015-2021)</p> <p>On the 22nd May 2015 Bengalla submitted MOP (2015 - 2021) to continue mining in accordance with new BCMP development consent SSD-5170. This was approved on the 3rd July 2015.</p>
2015	<p>Development Consent (SSD-5170) – Modification 1</p> <p>SSD-5170 MOD 1 was approved on the 16th December 2015.</p>
2016	<p>MOP (2015-2021) Amendment A</p> <p>In January 2016 Bengalla submitted this MOP (2015 - 2021) Amendment A to continue mining in accordance with Modification 1 of SSD-5170. This was approved on the 12th April 2016.</p>
2016	<p>Development Consent (SSD-5170) – Modification 2</p> <p>SSD-5170 MOD 2 approved 1 July 2016.</p>
2016	<p>Development Consent (SSD-5170) – Modification 3</p> <p>SSD-5170 MOD 3 approved 23rd December 2016.</p>
2017	<p>MOP (2017-2021)</p> <p>In August 2017 Bengalla submitted MOP (2017 - 2021) to continue mining in accordance with SSD-5170 as modified by MOD1-3. The requirements of SSD-5170 Condition 46 for an RMP were incorporated into this MOP as requested by DRG. This was approved on the 8th November 2017</p>
2018	<p>Development Consent (SSD-5170) – Modification 4</p> <p>DP&E granted SSD-5170 MOD 4 on 19th December 2018.</p>

Year	Details
2019	MOP (2017-2021) Amendment A In February, Bengalla submitted this MOP (2017 - 2021) Amendment A, to continue mining in accordance with SSD-5170 as modified by MOD1-4.
2020	MOP (2017-2021) Amendment B – This Document In May 2020 this MOP (2017 – 2021) Amendment B was submitted to the DPIE-RR to reflect an agreement between BMC and MACH Energy Australia Pty Ltd (MACH Energy) that enables Bengalla Mine to enter ML 1645 to the east of the Mount Pleasant Mine train loadout infrastructure.

1.2 Consents, Authorisations and Licences

The principal approval at Bengalla is Development Consent SSD-5170 as modified under Division 4.1 of Part 4 of the EP&A Act. SSD-5170 was granted in accordance with section 89E of the EP&A Act.

Bengalla is a Level 1 Mine and operates under a number of different approvals including;

- Development Consents and approvals issued by the [DPIE](#) and Muswellbrook Shire Council (MSC).
- EPBC Act approval, by the Commonwealth Department of the Environment and Energy (DoEE).
- Mining tenements issued by the [DPIE-RR](#).
- MOP approved by [DPIE-RR](#).
- Environment Protection License (EPL) issued by the Environment Protection Authority (EPA).
- Dangerous Goods Licenses issued by Workcover.
- Water Licenses issued by Department of Primary Industries – Water (DPI – Water).

In addition to its Development Consent, Bengalla operates under a number of mining authorities and various other licences and environmental mining related approvals as listed in Table 2.

Table 2: Consents, Leases and Licences

Approval	Tenement / Licence (Description)	Authority	Issue – Expiry Dates
Development Consent	SSD-5170 (as modified)	DPE	Issued: 03/03/2015 Expiry: 28/02/2039
Development Consent – Explosives Facility	DA 273/2006	MSC	06/09/2006 – Perpetuity
Mining Lease	ML1397	DPIE-RR	27/06/2017 – 27/06/2038
Mining Lease	ML1469	DPIE-RR	05/06/2000 – 05/06/2021
Mining Lease	ML1450	DPIE-RR	11/06/1999 – 11/06/2020

Approval	Tenement / Licence (Description)	Authority	Issue – Expiry Dates
Mining Lease	ML1728	DPIE-RR	10/02/2016 – 10/02/2037
Mining Lease**	ML1729	DPIE-RR	10/02/2016 – 10/02/2037
Mining Lease	ML1711	DPIE-RR	29/09/2015 - 17/12/2031
Sub Lease	ML1645 Sublease 1	DPIE-RR	ML1645 17/12/2010 – 16/12/2031
Sub Lease	ML1645 Sublease 3	DPIE-RR	
Sub Lease	ML1645 Sublease 4	DPIE-RR	
Bengalla Mining Operations Plan (MOP) “MOP (2017-2021)”	MOP	DPIE-RR	01/01/2017 – 31/12/2021 Submitted: August 2017 Approved: 8 th November 2017
Bengalla Mining Operations Plan (MOP) “MOP (2017-2021) Amendment B”	MOP	DPIE-RR	This MOP – Pending Approval Submitted: May 2019
Environmental Protection Licence (EPL)	6538	EPA	Anniversary Date 11 September
Hunter River Water Access Licence***	WAL001106	DPI Water	Tenure Type: Continuing
Groundwater Extraction Licence****	20BL169798	DPI Water	Expiry Date: 31/10/2015 [^]
Hunter River Pump	20PE001354	DPI Water	01/05/1997 – Annual
Licence to Store Explosives	07-100151-001	WorkCover NSW	Expiry Date: 10/01/2023
Licence to Store	XSTR100151	WorkCover NSW	Expiry Date: 10/01/2023
Radiation Management Licence	5061036	EPA	Expiry Date: 08/08/19

* DA 211/93 was surrendered to DPIE on 22 December 2016.

**ML 1729 replaced previous: Assessment Lease No. 13, Mining Lease No. 1592 and Authorisation No. 438.

***Bengalla's primary WAL for the Hunter Regulated River with 1,449 units of share component. Bengalla holds various other WALs for the Hunter Regulated River and other water sources.

****Bengalla's primary groundwater licence authorising extraction of water from the pit. Bengalla also holds various other groundwater licences under Part 5 of the Water Act 1912.

[^]Renewal sought.

1.3 Environmental Management System

Operations at Bengalla are conducted in accordance with SSD-5170 as modified, EPL 6538 and environmental management plans to ensure BMC effectively manages its environmental issues and complies with regulatory requirements.

In accordance with Schedule 3, Conditions 46(d) and 46(m) of SSD-5170 as modified, the rehabilitation requirements included in this MOP builds on other management plans required under SSD-5170 as modified. The rehabilitation at Bengalla will also consider the requirements of the Bengalla Biodiversity Management Plan. **The Biodiversity Offset Management Plan is a separate approved document relevant to land remote to Bengalla.**

Procedures and standards are regularly reviewed and updated as part of the continuous improvement of BMC's Environmental Management System (EMS).

1.4 Land Ownership and Land Use

The Upper Hunter region has a history of rural land use for agricultural and industrial activities, predominantly grazing and coal mining. The land surrounding Bengalla is largely dominated by mine owned land for various current or proposed mining operations. All of the land within the project boundary that is planned to be mined is owned by BMC. MACH Energy also owns a large area of land to the north of Bengalla associated with the Mount Pleasant [Mine](#). The land to the South of the Hunter River is held by BHP Billiton for the Mt Arthur Coal Complex.

Figure 1 and PLAN1C illustrates the land ownership surrounding Bengalla.

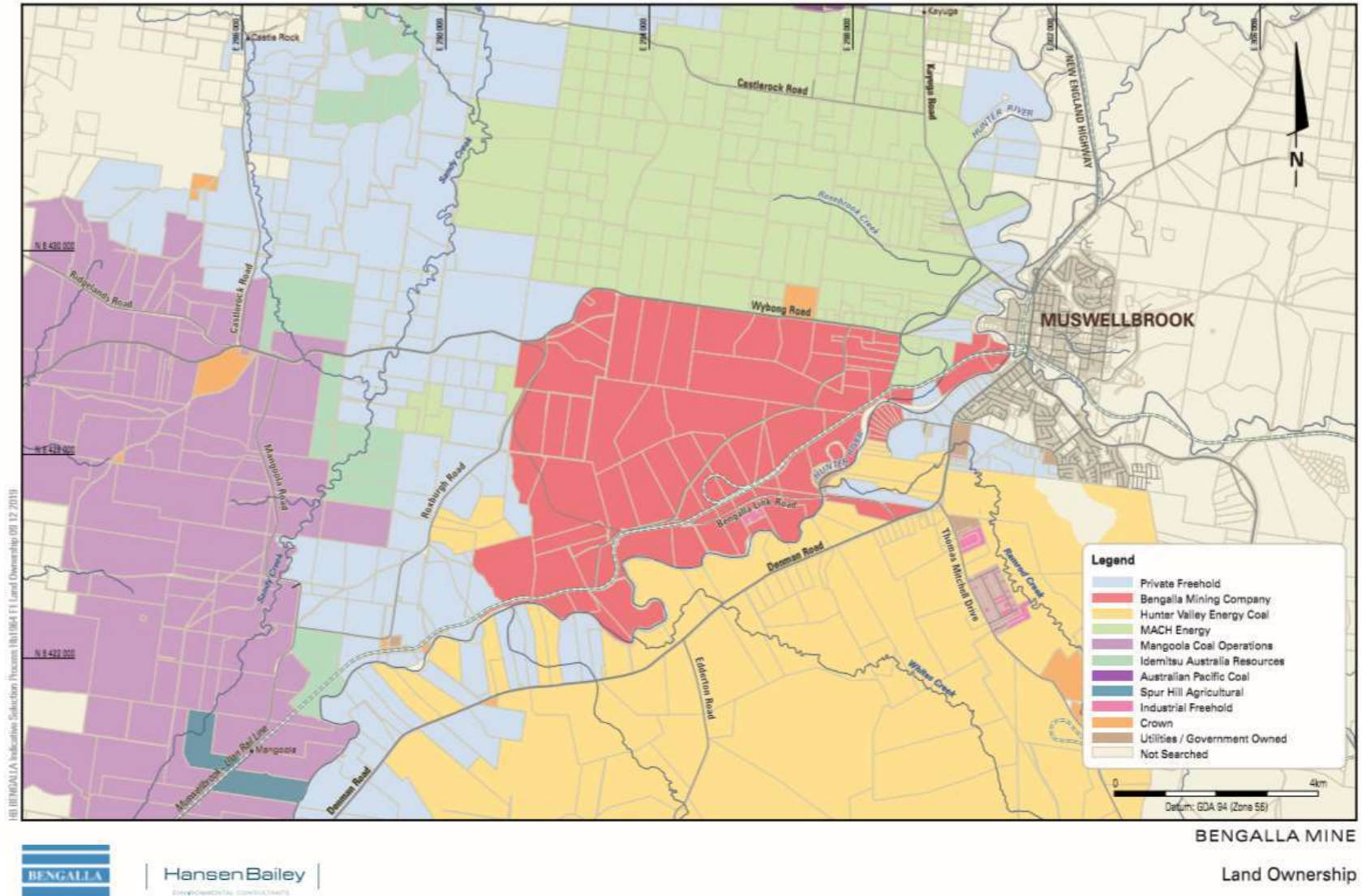


Figure 1: Land Ownership Plan

1.5 Stakeholder Consultation

BMC has conducted effective stakeholder engagement programs since its initial exploration licence was granted in 1991. BMC aims to build enduring relationships with its neighbours and communities of interest based on mutual respect, active partnership and long-term commitment.

There are a number of different groups which affect and are impacted by Bengalla's operations in the Muswellbrook area and these are identified and detailed in Bengalla's records. Broadly, the main stakeholder groups relevant to this Plan include:

- Local stakeholders.
- Employees.
- Near neighbours.
- Near neighbour communities (e.g. Muswellbrook, Aberdeen and Denman).
- Community groups.
- Local government (including MSC; Upper Hunter Shire Council).
- Local Aboriginal groups.
- Educational institutions (primary & secondary schools and TAFE);
- Local media.
- Neighbouring mines (BHP Billiton's Mt Arthur Coal, Muswellbrook Coal, Glencore Mangoola mine and MACH Energy Mt Pleasant [Mine](#)).
- State and federal government departments.

Corporate donations, sponsorships and media liaison are managed by BMC management and its Community Relations Co-ordinator. BMC seeks to be a valued member of the community and provide benefits to the local region.

Our objectives as a valued member and partner are:

- Building enduring relationships based on mutual respect and long term commitment.
- Effective engagement of community.
- Promote sustainable co-existence of mining and other activities.

BMC has a framework for engagement activities in the Muswellbrook community and surrounding areas. Separate community and stakeholder engagement plans are developed as required for specific projects or key engagement initiatives.

Key focus areas are:

- Local employment.
- Local economic development.
- Community Development.
- Indigenous participation.

Understanding and managing the expectations of key stakeholder groups will continue to be an important issue for BMC. BMC will continue to engage stakeholders as required to better understand their expectations and concerns.

1.5.1 Community Consultative Committee

Bengalla has a Community Consultative Committee (CCC) that provides a forum for community discussion. Community representatives act as the point of contact to provide feedback between the mine and the community. The CCC is comprised of members from the community, with representatives from BMC, MSC, and the local community.

Bengalla has a 24-hour environmental hotline for community issues relating to its operations. Bengalla has informed community members that they may contact the site at any time to lodge concerns or enquiries regarding mining operations. A system has been established to ensure an appropriate Bengalla representative responds to complaints.

1.5.2 Statutory Authorities

BMC has consulted with the DPIE-RR and other authorities regarding the preparation and content of the MOP and all amendments. Consultation with these authorities has occurred during recent approval submissions and environmental assessments. Statutory authorities also have the opportunity for ongoing involvement in Bengalla's operations through their representation on the CCC.

1.5.3 Rehabilitation Management Plan

Schedule 3, Condition 46 of SSD-5170 as modified states that BMC must prepare a Rehabilitation Management Plan (RMP) in consultation with the DPIE, DPI-Water (now the Natural Resources Access Regulator (NRAR)), the Department of Environment & Heritage (OEH), MSC and the Bengalla CCC. The RMP requirements under SSD-5170 as modified has been previously incorporated into this MOP.

The above stakeholders and MACH Energy were provided with a draft of MOP Amendment B for review. Comments received have been incorporated into this document as indicated in Table 3.

Table 3: Stakeholder Comments on MOP Amendment B

Agency	Comments	Where Addressed
DPIE	Section 5.1.1.5 on page 52 should include reference to the clay stockpiles for consistency with the rest of the document.	Section 5.1.1.5
OEH	Section 2.3.3.6 of the MOP describes the plan to sow the clay stockpiles with fast-growing pasture species to suppress weeds, however some of the species used for pasture rehabilitation at the mine site (in Table 24 of the MOP) can themselves be weeds and hinder future rehabilitation efforts. This is so for Rhodes grass (<i>Chloris gayana</i>) and kikuyu (<i>Cenchrus clandestinus</i>) which are persistent and vigorous species that outcompete native species, and delay achieving rehabilitation efforts. BCD recommends that the clay stockpiles are instead sown with a native grasses and herbs from the plant list in Table 25 of the MOP. This would lay a better foundation for revegetation of the reinstated Dry Creek supporting a new river red gum (<i>Eucalyptus camaldulensis</i>) population; a stated rehabilitation objective in Table 20 of the MOP.	Section 2.3.3.6

1.5.4 SSD-5170 Modification 4

BMC undertook a range of consultations for MOD 4 SEE described below. Further interaction with Government Agencies occurred through the public exhibition and response to submissions process as part of the assessment of MOD 4 SEE.

Bengalla Mine SSD-5170 MOD 4 SEE For Bengalla Mining Company	13 December 2017 Page 24
4 STAKEHOLDER ENGAGEMENT	
This section provides a summary of the stakeholder engagement undertaken for MOD 4 by BMC.	
Table 4 outlines the relevant level of consultation activities undertaken for MOD 4. Outcomes from discussions have been incorporated into this SEE.	
Various communication and engagement mechanisms will continue to be implemented to ensure the effective ongoing engagement with key stakeholders.	
Key stakeholder consultation avenues that are maintained by BMC include:	
<ul style="list-style-type: none"> • Consultation with the Muswellbrook community as required; • Updates to the BMC Community Consultative Committee; • Community Open Day (as required by BMC management); and • Preparation and distribution of the Bengalla Annual Review. 	
Table 4 Stakeholder Engagement and Consultation	
Stakeholder	Consultation
Department of Planning and Environment (DP&E)	<ul style="list-style-type: none"> • Meetings on 13 September 2017 and 8 December 2017.
Muswellbrook Shire Council (MSC)	<ul style="list-style-type: none"> • Meeting on 14 August 2017.
MACH Energy	<ul style="list-style-type: none"> • Provision of draft SEE document on 13 December 2017.
Community Consultative Committee	<ul style="list-style-type: none"> • 24 May 2017 presentation.

Figure 2: SSD-5170 Modification 4 Statement of Environmental Effects section 4

1.5.5 Rehabilitation and Post-Mining Land use

Provisions for the rehabilitation of mined areas are in accordance with the *Mining Act 1992* as administered by DPIE-RR. Rehabilitation plans and reports are prepared to satisfy the requirements of Government Agencies and other relevant stakeholders. Rehabilitation will be undertaken in consultation with the DPIE-RR and other relevant agencies.

Security deposits, usually in the form of a bank guarantee, are lodged with the DPIE-RR to ensure that rehabilitation is undertaken. These deposits are progressively reviewed as areas are rehabilitated.

Objectives for rehabilitation are integrated into mine planning to ensure compatibility with site constraints, mining operations, conservation objectives, community expectations, pre-mining land use, final land use, drainage, stability, soils, erosion control and visual compatibility.

2 Proposed Mining Activities

2.1 Project Description

Operations at Bengalla are conducted in accordance with SSD-5170 as modified and its supporting documents: Bengalla EIS, MOD 1 SEE, MOD 2 SEE, MOD 3 SEE and MOD 4 SEE. Bengalla is an open-cut strip mining operation where mining advances to the west. The advancing highwall allows the pre-strip fleet to mine ahead for both mine development and to prepare the next strip for the Dragline. The table below summarises some of the key Project components as per section 4 of the Bengalla EIS.

Table 4: Project components

Component	Project
Life of Mine	February 2039.
Deposit	316 Mt Run of Mine (ROM) coal within the mining areas
Mining Method	Open Cut – Dragline, truck and excavator (machinery will be progressively upgraded)
Production	Up to 15Mtpa ROM coal
Operational Hours	Mining operations and coal processing 24 hours per day, seven days per week
Workforce	Currently ~400 full time personnel, up to 315 additional contractors required during the construction periods and up to 900 full time equivalent personnel (plus contractors) at maximum production.
Blasting	Maximum of 4 blast events per day and 12 blast events per week averaged over a calendar year, between 7:00 am and 5:00 pm Monday to Saturday.
Coal Transport	All product coal is transported by rail (no road transport), up to 16 laden train movements per day
Coal Processing	CHPP including facilities to wash or bypass coal, 2600tph throughput of ROM Hopper and CHPP, CHPP stockpile capacity of approximately 1,215,000t, train load out capacity of 5,000tph, rejects are loaded into trucks and co-disposed in the OEA.
Infrastructure	See Table 5: Major assets by domain

2.2 Asset Register

Table 5 below details the primary domains and rehabilitation within the MOP area, their size at the end of the MOP (PLAN3E) and the major assets contained within.

Table 5: Major assets by domain

Domain	Size (ha)	Major Assets	Comments
DOMAIN 1 Infrastructure	335	<p>Including but not limited to:</p> <p>CHPP and associated infrastructure; rail loop and train load out facility, conveyors, stacker and reclaimer system, transfer stations and gantries, stockpile areas, ROM hopper and surge bins, thickener, reject bin, sewage plant</p> <p>Maintenance infrastructure including; maintenance workshop, wash bays, chemical storage, electrical infrastructure, radio tower, fuel and lubricant facility</p> <p>Fixed and temporary inpit infrastructure including but not limited to; crib and park up amenities, fuel farm, explosives storage, bioremediation farm, hot tyre park up, dragline substations, laydown areas and maintenance pads/hardstands, temporary reject cells, ROM coal stockpiles, roads network for the provision of access to and from the mining areas, water management structures and infrastructure</p> <p>Administration buildings, bathhouses, electrical infrastructure, access roads and parking facilities, core shed, helipad and ancillary infrastructure.</p>	<p>Assets within the Infrastructure Domain support the mining process for the production of saleable coal</p> <p>Decommissioning includes disconnection of services, the removal of assets from the domain, and remediation of the domain as per the rehabilitation tables.</p>
DOMAIN 3 Water Management	95	<p>Sediment water dams, mine water dams and clean water dams, diversion drains, levees and associated infrastructure, pumps and pipelines.</p>	<p>Assets within the Water Management Domain are used to manage both clean, sediment and mine water around site.</p> <p>Water management infrastructure not to be utilised in the post mining land use will be decommissioned.</p>

Domain	Size (ha)	Major Assets	Comments
DOMAIN 4 Overburden Emplacement Area	285	Temporary infrastructure from Domain 1 can be located on OEA's including but not limited to: hot tyre park up, bioremediation farm, crib rooms, maintenance pads.	Assets within the Overburden Domain support the mining process and allow the phases of rehabilitation to begin. Decommissioning includes removal of infrastructure and plant from the area.
DOMAIN 5 Topsoil Stockpiles DOMAIN 11 Clay Stockpiles	85	Topsoil and clay material	Used in Rehabilitation works to create secondary Domains.
DOMAIN 6 Active Void	187	Mining equipment including but not limited to dragline, excavators, loader, dozers, drills, haul trucks, auxiliary equipment, lighting sets, Pumps and Pipes.	Assets within the mining void are used in the process of mining to produce ROM coal. Decommissioning includes the removal of all plant from the domain.
DOMAIN 10 Temporary Stabilisation	41	None	Temporary stabilisation will typically not contain any assets as the area is disused and awaiting rehabilitation.
DOMAIN D – Pasture	42	Rehabilitated Land – Grazing Land	Vegetation will be included in the pasture areas to create biodiversity connectivity and windbreaks for stock shelter.
DOMAIN E – High Density Woody Vegetation (HDWV)	295	Rehabilitated Land – Visual Mitigation and Grazing Land	In progress
DOMAIN I – Final Void	0	N/A	Not started
DOMAIN K – Class III Pasture	5.7	Rehabilitated Land – Grazing Land	Not started
DOMAIN L – Dry Creek Restoration	0	N/A	Not started

Domain	Size (ha)	Major Assets	Comments
DOMAIN M – Tree Restoration	0	N/A	Not Started

Note: Domain areas presented in the table are approximate only.

2.3 Activities over the MOP Term

Plans 3A – 3E show the annual sequence mining and rehabilitation over this MOP term. They can be referred to in conjunction with the text below that describe the mining related activities. Plans 3A – 3E show the annual progress of mining related activities over the term of the MOP with the extraction limit generally adjacent to the eastern boundary of Mining Lease No. 1645 held by MACH Energy Australia Pty Ltd which applies from the surface to a depth of 40 metres south of Wybong Road (ML 1645). The extraction limit includes all proposed “significant surface disturbing activities” (as referenced in Bengalla’s mining lease conditions and the MOP Guidelines) east of ML 1645 being mining operations, mining purposes to support the mining operations, mining related infrastructure and prospecting. Mining operations and mining purposes are as defined in the Mining Act 1992 and include designated ancillary mining activities under section 6 of the Mining Act. Proposed significant surface disturbing activities are also shown on Plans 3A – 3E west of ML 1645. Note BMC has development consent to carry out significant surface disturbing activities within ML 1645 and the area west of ML 1645 and proposes to carry out such activities in those areas during the term of the MOP subject to gaining the necessary access (in which event those areas would also be within the extraction limit). Approved significant surface disturbance activities will occur both within and outside the approved pit shell as shown on Plans 3A – 3E.

2.3.1 Geology and Exploration

The approved mining area contains a multi-seam coal deposit consisting of eight economically viable open-cut mineable coal seams. Bengalla currently extracts coal from the Warkworth seam to the Wynn seam (previously to the Edderton) which form part of the Whittingham Coal Measures (see **PLAN 5**). Bengalla is situated on the western limb of the Muswellbrook Anticline with the coal seams generally dipping to the west at approximately 5 degrees. The average strip ratio at Bengalla is approximately 3.5 bank cubic metres (bcm) of overburden to each ROM tonne (t) of coal recovered. Faulting and igneous intrusion are not significant influences on Bengalla’s mine design, although they do have a localised impact on scheduling, wall stability, groundwater and coal quality. Most faulting is high angle normal faults trending in a Westerly to North-westerly direction.

Initial **and continuing** exploration programmes over mining tenements **are** planned with borehole spacing at approximately 600m. These boreholes include a mixture of open and cored holes and provide a broad understanding of the lithology, quality, **gas and other properties** in future areas. As mining progresses, the pre-production drilling targets the area ahead of the mine (approximately two years out from disturbance) ideally with core (diamond) holes completed at 300m spacing and chip (open) holes at 100m spacing’s. Additional drilling also occurs to target anomalies uncovered by mining, structure such as faults, or geotechnical information for the safe management of mine design.

The geology is logged in each borehole and geophysical properties are also obtained for correcting depth and thickness of the lithology's. All collars are surveyed and coal is sampled from the core holes to provide detailed quality information. This provides a level of confidence in the definition and delineation of the available resource, used for detailed modelling for structure and quality.

Pre-production drilling outlined above is undertaken regularly across mining tenements, and will continue. Disturbance and environmental impact is minimised through use of above ground sumps, and most drill site only requiring slashing for preparation.

Each year annual reports on coal exploration are completed and submitted to the NSW Department of Primary Industries / Minerals for the Bengalla Group (ML1397, ML1450, ML1469, ML1711, ML1728 and ML1729) and any other titles over the MOP. Each report includes exploration activities and associated expenditure undertaken within the previous 12 month reporting period and proposed exploration activities and expenditures for the following 12 month reporting period (details for each reportable area can be found in the "Annual Report on Coal Exploration", BMC).

2.3.2 Construction

Construction activities as described in [Bengalla EIS](#), and SEE's [MOD 1 to MOD 4](#) over the MOP term includes but not limited to a combination of; relocation of existing in-pit infrastructure generally ahead of mining, Dry Creek diversion works prior to mining through Dry Creek, and expansion work required to maintain and increase consented production levels.

Relocation of in-pit infrastructure will continue as required to facilitate the mining process within approved areas. **PLANS 3A to 3E** show probable approximate locations and disturbance areas for in-pit infrastructure as the mine advances. This includes but is not limited to:

- Inpit maintenance hardstands.
- Access and Haul Roads.
- Inpit Crib amenities and park up facilities.
- Inpit Fuel Farm.
- Water management facilities including water diversions, pipes and pumps, drainage structures and dams.
- Bioremediation Farm.
- Power line relocation/installation/decommissioning.
- North and South Dragline substations.
- Hot tyre park ups.
- Haul and access roads.
- Explosive Storage Facilities.
- ROM Coal Stockpiles.
- Temporary Reject Cells.

The current SDD, Washery Dam and Hunter river intake dam are currently planned to be relocated in 2019, depending on mine progression. These existing facilities will still be utilised as long as mining allows.

The approved Western OEA Dump, after a tenement has been secured, will be utilised as needed for dump capacity, with flat areas being utilised for in-pit infrastructure as mining progresses.

Construction activities for expansion include but not limited to:

- Additional HME (excavators, trucks and ancillary equipment).
- Additional administration buildings and parking facilities.
- Upgrades to maintenance facilities and workshop.
- Upgrades to and additional CHPP infrastructure (ROM hopper, surge capacity, stockpile areas, processing modules, processing rates, stacking and reclaiming systems, reject systems, train load out facilities).

Demolition activities are described in section 2.3.7

2.3.3 Mining Operations (including mining purposes)

2.3.3.1 Mine Design

The design of Bengalla operations is influenced by many physical, geological, economic, environmental and legislative factors and is aimed to maximise resource recovery. Delineating the mining reserves has been established based upon the limiting constraints defined by the lowest seam to be mined and the area extent of open cut mining.

The economic limit determined in the Initial Feasibility Study (1993), based on data provided in the original DMR tender papers was the base of the Edderton seam, although the final section of this seam was stepped up from in early 2014 due to economic factors, with the previous sections being stepped up from in the south due to managing geotechnical and safety issues.

The limit of oxidation (lox) line for the Edderton seam defined the eastern limit of the mine. This maximised the extraction of shallow Edderton coal and allowed full advantage to be taken of shielding provided by Overton Ridge. The limit of mining is defined by SSD-5170 (as modified) and ML1397, ML1469, ML1450 and ML1729 all for coal. The northern boundary of the lease area runs along Wybong road and adjoins MACH Energy Mount Pleasant [Mine](#). Access to barrier pillar coal in the Wybong road corridor is not provided for in the Bengalla Development Consent. All seams mined at Bengalla continue northwards into Mount Pleasant.

In the initial mining strips, the southern limit was defined by seam sub-crop. As mining progresses westward, the strips lengthen to the south and the constraint ultimately becomes the alluvial river flats since it is necessary to allow sufficient room for placement and rehabilitation of spoil without placing spoil on the alluvial flats. As a result of these limitations, the southern limit of mining trends to the southwest. Currently the limit of coal extraction is the north side of the 150m barrier zone to the Hunter River alluvium where the Wantana pit existed.

The strip length is currently up to 3km including the Wantana pit and runs in a north-south direction which is parallel to the sub crop and perpendicular to the dip. The seam dip has provided an acceptable slope for lower seams and relatively level floors for each strip in the north-south direction. The cross slope on the floor from east to west ensures the spoils are kept free draining and assists in the management of pit water.

The mine is designed as a dragline strip mine with pre-strip undertaken by excavator and truck fleets. The dragline has an operating radius of 105m and a nominal digging depth of 55 m and a dumping height of 55 m.

The design criteria used for pit generation are assessed geotechnically and consist of a combination of different drill and blast treatments, wall heights and bench widths to allow the safe extraction of coal at the given production rate.

2.3.3.2 Mine Equipment

Bengalla's mobile equipment fleet currently incorporates modern technology and includes a dragline, loading units including excavators and loaders, a fleet of trucks, and other ancillary equipment including bulldozers, water carts, graders, drills, fuel/lube trucks, pumps, lighting plants, loaders, and various light vehicles and service vehicles.

2.3.3.3 Mining Sequence

The mining sequence for the pre-strip fleet at Bengalla begins with topsoil removal and stockpiling, then continues into the cyclic process of drill and blasting of the overburden/interburden, moving the overburden/interburden with loading units and trucks to the OEA to uncover the coal seam. The coal is then mined with loading units and trucks to be transported to the **temporary ROM coal stockpile and/or ROM Hopper** to be processed. This process is repeated until the lower dragline horizon is reached where a similar process is followed with the main difference of the dragline moving the majority of the interburden from highwall to low wall instead of loading unit and trucks.

As each strip is completed, the void created from the mining process is backfilled with the interburden from advancing strips. Once the OEA has reached the final landform height, reshaping is completed and topsoil is then removed from existing stockpiles or directly from the advancing pre-strip and used on the shaped landform to start the rehabilitation process.

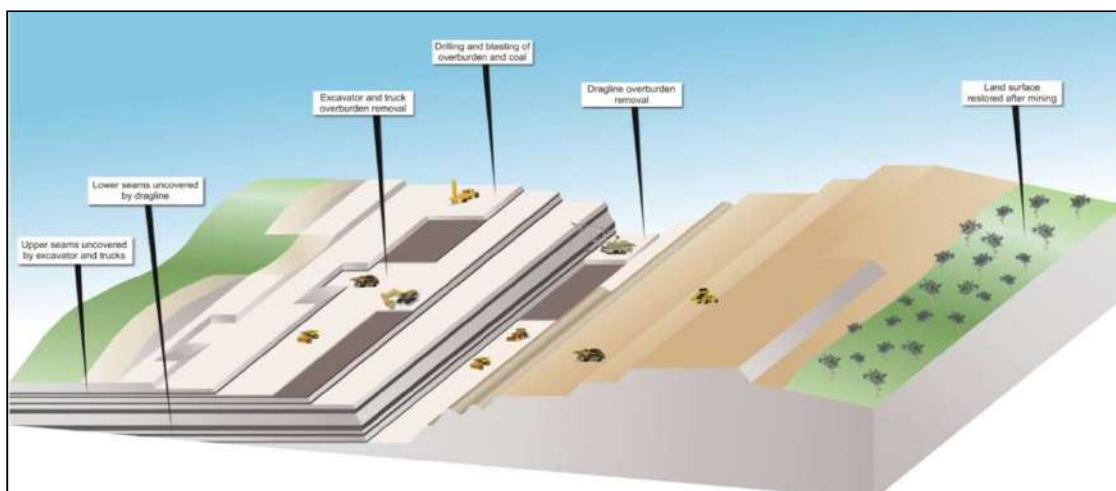


Figure 3: Schematic of Bengalla's Mining Sequence

Over the MOP term mining is currently planned to take place in Strips 28 to 43 generally using the sequence outlined above. Mining occurs over several strips at any one time to allow the pre strip to prepare the next dragline strip as well as maintain coal flow. Significant surface disturbing activities including mining operations, designated ancillary mining activities under section 6 of the Mining Act and prospecting are undertaken **in and around** the active mining area as described in Section 2.3.

2.3.3.4 Land Preparation

Land preparation for mining at Bengalla consists of weed management and vegetation removal. Bengalla has a history of grazing prior to mining and as such there is a heavier weed seed content in the topsoil than would be found in a native plant community where historic land disturbance has not

occurred. Consequently, weed management [where required are](#) to be undertaken prior to topsoil stripping to minimise the presence of weeds in the topsoil. This is more successful and cost effective than controlling weeds once they have established in rehabilitated areas.

The Bengalla pre-clearing and clearing procedures are described in the approved Biodiversity Management Plan. Prior to disturbing new areas, the BMP requires a Ground Disturbance Permit (GDP) to be completed by the Environment [Superintendent](#) (or delegate) to identify environmental issues associated with the works.

Habitat trees and salvage materials identified during the pre-clearing survey are recovered and either used directly on rehabilitation areas or stockpiled for later rehabilitation works.

2.3.3.5 Topsoil Stripping

A soil and land capability impact assessment was completed as part of the Bengalla EIS. This assessment describes soil types, suitability and recommended stripping depths and how these vary across site. The recommended topsoil stripping depths varies from 0 – 0.6m.

Topsoil stripping occurs ahead of the active mining area [or where infrastructure is to be constructed](#).

Topsoil stripping is undertaken by a bulldozer and available topsoil is removed by truck and loader for rehabilitation purposes. Whenever practical, topsoil stripping will be undertaken under slightly moist conditions to maintain soil structure and minimise dust. If it is too wet compaction can occur and if it is too dry then dust can be produced.

Where possible, topsoil is stripped to clay or secondary horizons and either directly placed on available rehabilitation areas or stockpiled for later use. In the event that rehabilitation areas are not immediately available, topsoil is stockpiled within designated areas such as on the unshaped areas of the overburden emplacement (i.e. on the 270RL level and the 240RL level) or in areas ahead of mining. Topsoil stockpiling alongside areas waiting to be [rehabilitated where reasonable and feasible](#) allows the topsoil to be readily pushed without the need for rehandling.

2.3.3.6 Topsoil and Clay Stockpiles

Topsoil Stockpiles

Topsoil stockpiling will continue to be necessary at Bengalla to ensure adequate topsoil for rehabilitation, and the success of the post mining land use. Bengalla aims to minimise topsoil stockpiling through progressive rehabilitation of the final shaped landform as it becomes available. [Please see Plan 3D and Plan 3E for topsoil stockpile locations](#).

Where topsoil stockpiles are required, the following will be adopted;

- Stockpiles will be located outside of proposed mining areas and away from slopes and drainage lines where possible.
- Where possible, stockpiles will be [up to approximately 3 metres high](#) in order to minimise issues with anaerobic conditions.
- Stockpiles will be located to prevent sediment water runoff leaving the site [and will have sediment controls installed on the downslope sides to collect and filter any sediment laden runoff from the stockpile where there is potential for the sediment to discharge off-site](#).

- All topsoil stockpiles will be loose and uncompacted to provide for aeration, water and nutrient infiltration, microbial activity to prevent further deterioration to the soil structure, but shaped with a shallow slope towards downslope sides for even sheet flow off the top of the stockpile.
- Topsoil stockpile top and batters will be left rough and uncompacted and batters will be graded will be up to approximately 3 (V):1 (H).
- Stockpiles should be sown with suitable short or long-term pasture species depending on the duration of storage, i.e. ≤ 12 months or >12 months, to establish a protective vegetative cover and maintain biological activity to preserve the topsoil resource's qualities. Rhodes grass (*Chloris gayana*) and kikuyu (*Cenchrus clandestinus*) will not be used for the seeding of topsoil stockpiles.
- Topsoil storage locations will be demarcated with signage identifying the stockpile by name, soil unit type and soil unit location.
- All appropriate information will be recorded, e.g. date of location creation, coordinates of stockpile location, stockpile name (e.g. Topsoil Stockpile Z (TSZ)), soil unit name (e.g. Deep Sodosol) and location, maximum height of stockpile, surface area of location, maximum volume to be stored at location and tracking of additions (volumes) by month).
- Stockpiles will be inspected as soon as practicable following significant rainfall events that are likely to have produced runoff on the topsoil stockpile areas for signs of sheet, rill, tunnel and/or gully erosion. Where erosion is identified, works will be undertaken as soon as practicable to stabilise the stockpile and prevent further erosion, degradation and loss of the topsoil resource.
- Topsoil stockpiles stored for >12 months will be:
 - Inspected annually to assess whether vegetative cover is $>90\%$ and mulch cover of the soil surface is $>90\%$. Where deficient, appropriate treatments will be applied, such as additional seed or mulch to the deficient areas.
 - Sampled and analysed annually for appropriate parameters to ensure the topsoil resource is being maintained within completion criteria or ameliorated where results demonstrate that quality is deteriorating.
- Weed control strategies will be implemented particularly for noxious weeds. This may include:
 - Application of selective and/or non-selective herbicide (dependent on species that colonise the stockpiled material).
 - Scalping of the top approximate 100mm of the stockpiled material to remove the weed seed load prior to handling / placement on rehabilitated areas.
 - Stockpiles will be inspected monthly, or more frequently where specific weed species have lifecycles that produce seeds in less than a month for weed growth and sprayed accordingly to prevent weed species from flowering and seeding.

Clay Stockpiles

Dry Creek will be reinstated towards the end of mine life being 2039. Some 450,000m³ of clay approximately will be borrowed from the existing Dry Creek area ahead of mining and stockpiled for later use in Dry Creek reinstatement. Please see Plan 3D and Plan 3E for clay stockpile locations.

The clay stockpiles required for the reinstatement of Dry Creek will be established and managed for the duration of the stockpiling period in accordance with the following management measures:

- Stockpiles will be up to approximately 10 m high.
- Stockpile slope faces will be up to approximately of 1 (V) : 3 (H).
- Stockpiles will be left in a non-smoothed (rough) condition to minimise initial compaction, allow rainfall infiltration and minimise runoff.
- A rapid growing perennial pasture mix will be sown on all stockpiles to provide sufficient competition to minimise the emergence of undesirable weed species.
- Regular (monthly) inspections of the stockpiles will be made as soon as practicable following significant rainfall events. The following features will be checked:
 - Integrity of erosion control measures.
 - Integrity of sediment controls.

- Effectiveness of drainage
- Pasture growth
- Weed infestation.
- Remedial measures will be undertaken as necessary. Emphasis should be placed on controlling weeds prior to flowering and revegetating to reduce degradation of the clay stockpile and/or loss of clay.
- All vehicle traffic and grazing stock animals will be excluded unless unavoidable from traversing the stockpiles/windrows for the duration of the subsoil storage period to prevent compaction, damage to the subsoil structure, damage to the pasture sward and minimise the potential for erosion of the subsoil stockpile.
- Clay stockpiles will be signposted, surveyed and treatment records maintained.

2.3.4 Rock/Overburden Emplacement

Mineral waste from mining overburden and interburden is hauled by truck, or placed directly by the dragline, into the OEA east of the active pit, into the void that has been created from mining.

As each dragline strip finishes, the trucks begin to dump on the spoil peaks behind the dragline and begin as soon as possible to develop the **approximate** 7m lifts that allow for reject emplacement within the truck dump section of the OEA. Each lift allows for 1-2m of reject and 5-6m of overburden for encapsulation, where rejects will either be dumped prior to, or dumped during encapsulation. The dragline as it starts the new strip will begin to fill the void from last strip just completed.

Bengalla does not have tailings storage facilities so reject material generated from the processing phase is conveyed to the 400t capacity reject bin, where haul trucks are loaded for co-disposal with overburden in the existing OEA. Reject material is either placed directly within cells developed in the existing OEA or is stored in temporary reject cells. This material is then rehandled to final emplacement within the existing OEA.

The potential Acid Rock Drainage (ARD) material associated with the Archerfield sandstone mined during the Wynn interburden, is mostly mined by the dragline, and placed on the western side of the dragline spoil piles and is subsequently covered with neutralising overburden from the final pass of the dragline operation as well as material hauled into position by the truck fleet. The portion of ARD material mined by excavator and truck is dumped as low in the dump as **reasonable and feasible** below the final surface.

The placement of reject and carbonaceous material is planned at least 5m below the final landform in order to minimise the possibility of spontaneous combustion. Reject material at Bengalla is typically benign. As the OEA is filled to final design it is progressively shaped and rehabilitated.

Over the MOP term the main OEA will continue to be utilised, with focus on the southern and northern faces and implementing the visual relief areas in the north to 300RL and south to 290RL. This will ensure the rehabilitation is consistent with SSD-5170 as modified. This will further assist in improving visual impacts on the township of Muswellbrook and **Denman**.

There is currently a Western OEA that is approved to be constructed pending mine planning requirements and is described in the Bengalla EIS and is on the western side of Dry Creek and has a capacity of 15Mlcm's. This overburden emplacement capacity is to assist in alleviating the dump capacity shortage previously identified, although material is planned to be minimised where possible to avoid rehandle.

2.3.5 Processing Residues and Tailings

Coal is transported via haul trucks from the mine to the **temporary ROM coal stockpiles and/or the ROM** hopper which has an approved capacity of 2600tph (tonnes per hour). The first stage of coal processing involves crushing ROM coal to less than 250mm in size. The crushed coal is then transported along a conveyor to a secondary crushing station where it is reduced to less than 50mm. After crushing, coal can be bypassed to product, direct fed into the CHPP or transported and stockpiled on the raw coal stockpile via conveyors.

Bengalla's CHPP currently has three coal stockpiles in the handling and preparation process. The Raw coal stockpile has a capacity of up to approximately 200,000t and the two product stockpiles hold a combined volume of up to 500,000t. Current approvals is for **approximately 1,215,000t CHPP** stockpile capacity.

The CHPP is a two stage plant that can change from single stage to two stage washing when required and has an approved capacity of 2,600tph. A combination of dense medium cyclones (DMC) and single stage spirals are utilised to process coal. After processing, the product coal is centrifuged for the purpose of moisture reduction and then stacked onto one of the two product coal stockpiles.

Product (**includes bypass**) coal is reclaimed from the stockpiles and transported to the train load out facility (TLO) which is a fully automated system that currently averages approximately 3,500tph into trains (with an approved capacity of 5,000tph).

Since Bengalla does not have a tailings dam, the fine reject material is thickened and dewatered and then combined with other coarse reject streams generated from the processing and conveyed to a rejects bin, where haul trucks are loaded and are generally taken to the existing OEA for co-disposal with overburden, or to a temporary storage area where it is then rehandled and taken to the OEA at a later stage.

2.3.6 Waste Management

2.3.6.1 Non-Mineral Waste Management

Bengalla produces non-mineral waste such as scrap steel, oil and general waste as a result of its activities. Non-mineral waste that cannot be recycled and is considered non-hazardous is disposed of at appropriate landfill facilities. Hazardous non-mineral waste that cannot be re-used or recycled is collected and sent off site for treatment and specialised disposal.

Bengalla operates a non-mineral waste management system. This includes the day-to-day management of waste streams. Waste **at Bengalla** is correctly handled, stored, segregated, recycled and reused.

2.3.6.2 Sewage Waste

Bengalla has a sewage treatment plant where sewage is passed through a series of aeration dams into a settling dam to allow settlement of solids. The liquid is then passed through a weir and into a contact chamber as it is dosed with Sodium Hypochlorite to disinfect the water. This water is then released into the Facilities Dam. Water testing is undertaken prior to and after the release of this water into the water management system.

2.3.7 Decommissioning and Demolition Activities

Most demolition activities will be associated with the relocation of input infrastructure. Demolition and deconstruction activities associated with rehabilitation to achieve post mining land use will be minimal as all of the planned rehabilitation for this MOP term will be from the OEA.

2.3.8 Progressive Rehabilitation and Completion

Rehabilitation at Bengalla is undertaken progressively and as soon as practicable after the completion of surface preparation (typically within a period of three months). Inert capping material and topsoil is spread over areas to be rehabilitated as soon as possible, to maintain topsoil quality and take advantage of native seed-banks if present. This minimises the areas of disturbed land; reduces future rehabilitation liabilities; minimises visual impacts and helps suppress the potential for wind-blown dust and erosion. Seeding of a rehabilitation area commences as soon as practical after scarification, if required, tube stock may be planted.

The proposed rehabilitation program is shown diagrammatically on Plans 3A- 3E

2.3.9 Material Production Schedule During MOP Term

The proposed material production schedules for Bengalla for the period covered by this MOP are shown below in Table 6.

These production figures have been extracted from the Bengalla 2015 Annual Operating Plan (AOP), and may increase or decrease depending on the Life of Mine Plan, the Mine Plan and mining sequence.

Table 6: Material Production Schedule during the MOP Term

Material Production Schedule during the MOP Term						
Material	Unit	Year 1 (2017)	Year 2 (2018)	Year 3 (2019)	Year 4 (2020)	Year 5 (2021)
Stripped topsoil	bcm	153,000	150,000	140,000	120,000	130,000
Rock/Overburden (Prime)	Mbcm	42.63	41.20	45.49	46.00	47.00
Ore (ROM Coal)	Mt	10.72	10.75	10.78	10.70	10.70
Reject Material	Mt	2.57	2.49	2.54	2.50	2.50
Product Coal	Mt	8.78	8.87	8.87	8.75	8.75

3 Environmental Issues Management

3.1 Environmental Risk Assessment

The key risks associated with the proposed mining activities at Bengalla during the term of this MOP have been assessed using the likelihood ratings, maximum reasonable consequence ratings, risk matrix and classifications listed in Table 7 to Table 10 respectively. The Risk Assessment process is based off AS/NZS ISO 31000:2009 Risk Management – Principles & Guidelines.

Table 7: Risk Likelihood Ratings

Class	Likelihood	Likelihood Description	Frequency
A	Almost certain	Recurring event during the life time of the operation / project	Occurs more than twice per year
B	Likely	Event that may occur frequently during the life time of an operation / project	Typically occurs once or twice per year
C	Possible	Event that may occur during the life time of an operation / project	Typically occurs in 1-10 years
D	Unlikely	Event that is unlikely to occur during the life time of an operation / project	Typically occurs in 1-100 years
E	Rare	Event that is very unlikely to occur during the life time of an operation / project	Greater than 100 year event

Table 8: Maximum Reasonable Consequence Ratings

Class	Consequence	Consequence Description
1	Minor	Near-source confined and promptly reversible impact on-site, with little or no off-site impact expected
2	Medium	Near-source confined and short-term reversible impact on-site, with little and promptly reversible off-site impact
3	Serious	Near-source confined and medium-term recovery impact on-site, with near-source confined and short-term reversible off-site impact
4	Major	Impact that is unconfined and requiring long-term recovery, leaving residual damage on-site with near-source confined and medium-term recovery of off-site impacts
5	Catastrophic	Impact that is widespread (or unconfined) and requiring long-term recovery, leaving major residual damage on-site with off-site impacts that are unconfined and requiring long-term recovery and leaving residual damage

Table 9: Risk matrix

Consequences Likelihood	1 - Minor	2 - Medium	3 - Serious	4 - Major	5 - Catastrophic
A – Almost Certain	Moderate	High	Critical	Critical	Critical
B – Likely	Moderate	High	High	Critical	Critical
C – Possible	Low	Moderate	High	Critical	Critical
D – Unlikely	Low	Low	Moderate	High	Critical
E - Rare	Low	Low	Moderate	High	High

Table 10: Risk Classifications

Risk Class	Risk Management Response
Critical	Risks that significantly exceed the risk acceptance threshold and need urgent and effective attention.
High	Risks that exceed the risk acceptance threshold and require proactive management. While proactive actions are undertaken, further risk reduction is impracticable suggesting a need for compensatory measures.
Moderate	Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of specific safeguards could be used to reduce risks further.
Low	Risks that are very unlikely and of low consequence, and do not require active management. Nevertheless, some potential for certain risks to occur remains and could require specific monitoring.

Table 11 below outlines the key identified environmental risks and associated risk ratings. The ratings assume that the risks are untreated i.e. have not been addressed by specific risk mitigation measures other than routine design and operational practices.

Table 11: Environmental Risk Assessment

Issue	Management Plan	Exploration	Pre stripping Activity (vegetation and topsoil)	Mining	Waste rock/overburden management operations	Rehabilitation	Rehabilitated lands and remaining land management	Maintenance equipment/ facilities	Mineral Processing	Rejects management operations	Product stockpiling and handling (to rail loadout)	Sewage Treatment	Non-Mineral Waste Management	Water Management
Air Quality, Dust unless specified	✓	Low	Mod	High	High	High	-	Low	Mod	Low	Mod	-	-	-
Erosion and Sedimentation	✓	Low	Mod	Mod	Low	Mod	Low	Mod	-	-	-	-	-	Low
Surface Water	✓	Low	Mod	Mod	Mod	Mod	Mod	Mod	High	Low	Low	High	Low	High
Ground Water	✓	Low	-	Mod	Mod	-	-	-	-	Low	-	-	Low	Mod
Contaminated Land/ Hazardous Substances	✓	Low	-	Mod	Low	Low	Mod	Mod	Low	Low	Low	High	Low	Mod
Acid Mine Drainage	✓	-	-	Mod	Mod	Low	Low	-	-	Low	-	-	-	Mod
Flora and Fauna	✓	Low	Low	Low	-	Low	Mod	-	-	-	-	-	-	-
Weeds and Vertebrate Pests	✓	-	Mod	-	-	Mod	Mod	-	-	-	-	-	-	-
Operational Noise	✓	Mod	High	High	High	High	-	Mod	High	Low	Mod	-	-	-
Noise and Vibration	✓	Mod	Mod	Mod	Mod	Mod	-	Low	Mod	Low	Low	-	-	-
Visual and Lighting	✓	Low	Mod	Mod	Mod	Mod	Low	Mod	Low	Low	Mod	-	-	-
Heritage (European)	✓	Low	-	-	-	-	-	-	-	-	-	-	-	-
Heritage (Aboriginal)	✓	Low	Mod	Low	Low	-	-	-	-	-	-	-	-	-
Spontaneous Combustion	✓	-	-	Mod	Mod	Low	-	-	Mod	Low	Mod	-	-	-
Bushfire	✓	Low	Low	Low	Low	Low	Low	Low	-	-	-	-	-	-
Mine Subsidence	✓	-	-	-	-	-	-	-	-	-	-	-	-	-
Public Safety		Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Greenhouse Gas	✓	Low	Low	Mod	Mod	-	-	Low	Low	Low	Low	-	-	-
Non-Mineral Waste Management		-	-	Low	Low	-	-	Low	Low	-	-	-	Mod	-

3.2 Environmental Risk Management

The HSE Management System enables the operations to apply specific tools that support the implementation, execution and effectiveness of Bengalla's safety and environmental performance. The HSE management system is designed on the principles of continuous improvement. The Plan, Do, Check and Review cycle:

- Plan identify what is required.
- Do implement the activities.
- Check monitor performance through checking and corrective action.
- Review evaluate the suitability, adequacy and effectiveness of the system through the management review.

These steps are subdivided into elements describing the requirements of the system.

3.2.1 Environmental Management Documents

Management Plans and Monitoring Programmes are prepared as required by development consent conditions.

Environmental procedures have been established, documented and maintained for mining related activities that have a potentially significant impact on the environment (see Table 12). Procedures provide details of operation and maintenance of facilities, equipment and machinery where required. BMC procedures can be accessed by employees and contractors via Lotus Notes (an internal database).

Table 12: Environmental Management Documents

Bengalla HSE System	
HES Management Policy Procedures	
1. HSE Policy	
2. Legal & Other Requirements	
3. Hazard Identification & Risk Management	
4. HSE Management Improvement Planning	
5. Organisation, Accountability & Responsibility	
6. Training, Competency & Awareness	
7. Supplier and Contractor Management	
8. Documentation & Document Control	
9. Communication & Consultation	
10. Operational Control	
11. Management of Change	
12. Disaster Management & Recovery	
13. Measuring & Monitoring	
14. Non-conformance, Incident & Action Management	
15. Data & Records Management	
16. Performance Assessment & Auditing	
17. Management Reviews	
Environmental Management Plans	
Visual Impact Management Plan	Environmental Management Strategy
Historic Heritage Management Plan	Air Quality Management Plan
Water Management Plan	Aboriginal Cultural Heritage Management Plan
Noise Management Plan	Biodiversity Management Plan
Pollution Incident Response Management Plan	Biodiversity Offset Management Plan
Blast Management Plan	

3.2.2 Specific Risks relating to Rehabilitation

3.2.2.1 Geology and Geochemistry

The general geological context of the mine can be found in Section 2.3.1. Below is the summary of the geochemical characteristics of Bengalla:

- All overburden apart from the Wynn Interburden (Archerfield Sandstone) has negligible (<1%) sulphur content, excess Acid Neutralising Capacity (ANC) and is classified as Non-Acid Forming (NAF).
- All overburden material, apart from the ASS located above the Wynn seam, has a high factor of safety with respect to potential acid generation. Current management methods for ASS materials at the open cut are sufficient to minimise the risk of any significant impact to the environment.
- The concentration of total metals in overburden (and coal reject materials) is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation.
- The concentration of trace metals and sulphate in run-off and seepage from overburden will be low.
- Overburden will generate alkaline run-off and seepage with low salinity values following surface exposure. The salinity of run-off and seepage from overburden materials is likely to decrease over time.
- Some overburden material may be sodic and have structural stability problems related to potential dispersion and erosion.
- Coal reject contains elevated sulphur content however the only material that is classified as Potentially Acid Forming (PAF) is from the Wynn seam.
- The concentration of trace metals and sulphate from most coal rejects will be low. However, Wynn coal reject materials have the potential to generate elevated concentrations of some metals (Al, Cd, Co, Cu, As, Ni, Se and Zn) if exposed to oxidising conditions.
- Current management methods for Wynn coal reject and other coal reject materials at the open cut are sufficient to minimise the risk of any significant impact to the environment.

Bengalla manages the mineral wastes produced by mining. This minimises the potential influence of geochemistry issues affecting rehabilitation. It includes ARD, reject and carbonaceous materials which are all dumped at least 5m below the final landform.

3.2.2.2 Spontaneous Combustion

Coal and other carbonaceous materials can react with oxygen in the atmosphere to produce heat. In some cases heat can be trapped and the temperature of the material rises. This may lead to conditions that result in spontaneous combustion. Bengalla shall employ procedures to minimise the likelihood of this process to occur within the constraints of the overall mining method. As a broad principle, known reactive materials are to be covered with thick layers of inert waste material. The maintenance of inert material over potentially reactive waste (as per design criteria) reduces the risk of spontaneous combustion at Bengalla.

Bengalla has a low potential for spontaneous combustion influencing rehabilitation outcomes as any prone material is not used in or near rehabilitation works. Historical occurrences of spontaneous combustion have generally been isolated areas in the Dragline low-wall from wasted carbonaceous material or on the highwall where disturbed or oxidised coal has been left open to the atmosphere for a long period of time resulting in heating. Recently this has been in the Vaux2 and Warkworth1 coal seams.

The Vaux2 coal seam that has historically heated has been due to wasted sections of the seam (deteriorating quality) being blasted through as part of an interburden horizon and has been exposed to oxygen for several months, and when the coaling and drill and blast operations have occurred in the next strip this has accelerated the oxidisation of the wasted coal. The Dragline has then been usually required to dig this material out and bury it low in the OEA. Management of spontaneous combustion in this seam consists of removing any wasted coal in the previous strip that is exposed at the top of the interburden to remove this risk, which has been shown to be effective mitigation.

The Warkworth 1 coal is the highest seam in the coal measures at Bengalla and is prone to spontaneous combustion when it is both oxidised by the weathering zone and blasted through as part of the overburden blast. If the Warkworth 1 coal seam spontaneously combusts it is generally removed by truck and excavators and buried as low in the OEA as possible from the available dumps active at the time, encapsulated with inert material well below the final surface.

3.2.2.3 Material Prone to Generating Acid Mine Drainage

Conditions favourable to producing ARD may occur when pyritic material is exposed to the atmosphere and water which react to produce acidic surface water or groundwater flows. Bengalla shall employ procedures to minimise the likelihood of either of these processes to occur within the constraints of the overall mining method. As a broad principle, known reactive materials are to be covered with thick layers of inert waste material.

The Wynn Interburden has been identified as being potentially acid generating although this is low risk. The management of dumping and encapsulating this material results in Bengalla having a low potential for acid mine drainage influencing rehabilitation outcomes.

3.2.2.4 Mine Subsidence

Mine subsidence is not an issue at Bengalla as there is no underground mine activity.

3.2.2.5 Erosion and Sedimentation Control

There is potential for erosion and sedimentation on rehabilitated areas at Bengalla. **Sediment mobilisation and erosion will be minimised on rehabilitation areas where reasonable and feasible by:**

- Progressively rehabilitating disturbed land;
- Shaping rehabilitated land to minimise sheet flows and to direct water to sediment dams;
- Topsoil cultivation during the rehabilitation process, where required, to promote infiltration;
- Installation of rock riprap, geotextile fabric sediment filters or other suitable measures on steep gradients, as required.

3.2.2.6 Soil Types and Suitability

Assessments of the suitability of topsoil for use in rehabilitation activities have been undertaken as part of the Bengalla EIS.

More information on topsoil management can be found in sections 2.3.3.4, 2.3.3.5 and 2.3.3.6

3.2.2.7 Flora and Fauna

Operational areas at Bengalla are located across predominantly Class IV and Class V grazing and agricultural land which has experienced disturbance in the past. The majority of the leases have been cleared, grazed and invaded by exotic grasses and shrubs.

Species from the remnant vegetation communities where **reasonable and feasible** have been incorporated into the seed mixes for Domains returning to pasture, **HDVV**, tree corridors and Dry Creek. **Bengalla also recovers suitable habitat trees to place in the rehabilitation area.**

Noxious weeds will be controlled using a combination of mechanical, biological and chemical controls. Bengalla also undertakes feral animal management and control as required.

3.2.2.8 Air Quality

BMC seeks to minimise environmental impacts from its operations where reasonable and feasible. BMC has a comprehensive set of proactive and reactive control measures and monitoring tools which are designed to minimise the generation of wind-blown dust from disturbed surfaces, mining activities and greenhouse gas emissions leaving site.

The predictive and reactive air quality management system includes:

- **A predictive component using weather forecasts and dispersion modelling.**
- **A daily forecast report providing information on temperature inversions, wind conditions at various heights and predictive dust plumes.**
- **A reactive component using real-time meteorology and air quality monitoring data including dust alarms and wind speed alarms to alert the operation regarding potential dust generation to enable management of potential dust impacts.**

When monitoring results are below the criteria no further action is required. When monitoring results are above the criteria an analysis is undertaken to determine if Bengalla exceeded the criteria or contributed to an exceedance of the criteria with any exceedances recorded.

3.2.2.9 Slopes and Slope Management

Bengalla manages geotechnical risks across site that includes low-wall stability. This directly relates to the final landform through ensuring safe and stable dumps are designed and **constructed** during the mining process, and remains stable during and after rehabilitation.

3.2.2.10 Surface Water

The Bengalla water management system is described by reference to four water types which are listed below.

Clean Water - Water pumped from the Hunter River into the Hunter River Raw Water Dam or run-off from a catchment that is undisturbed by mining and associated activities. Runoff from fully rehabilitated mined out areas where the rehabilitation area has been relinquished.

Mine Water - Water that accumulates within, or drains from, active mining and infrastructure areas and any other areas where run-off may have come into contact with coal or carbonaceous material (synonymous with 'dirty water').

Sediment Water - Runoff from areas disturbed by mining and associated activities that has not come into contact with coal or carbonaceous material. Includes water from non-relinquished rehabilitation areas.

Contaminated Water - Associated with water used by the vehicle wash bay and bathhouse that is captured and processed to enable its transfer and reuse in the mine water system.

Water management at Bengalla is based on the following key principles (which are generally followed except where circumstances dictate that there is an overall environmental advantage to do otherwise):

- Minimise use of clean water from external sources;
- Where possible, divert clean water away from areas disturbed by mining and associated activities;
- Collect sediment water in catch drains and direct to sediment traps and settling dams, and where required reuse in the Bengalla water management system;
- Collect runoff from industrial areas (mine water) in catch drains and transfer to storage dams for reuse, where required, in the Bengalla water management system;
- Transfer of open cut pit water (mine water) to storage dams and where required re-use in the Bengalla water management system; and
- Minimal off-site discharge of surplus mine water.

3.2.2.11 Ground Water

Bengalla geology comprises three distinct units being the Permian strata, Permian basement (regolith), and a Quaternary alluvium. The alluvium thickens towards the Hunter River and comprises the Hunter River alluvial aquifer. The Permian coal seams also act as aquifers and interconnect with the Hunter River alluvium at depth. The regolith at Bengalla is generally unsaturated with minor ephemeral drainage. On this basis, the two key groundwater systems are:

- The aquifer associated with the Hunter River alluvial, which is up to 14 m thick and consists of an upper silty clay layer and a basal gravel.
- The water bearing units of the Permian strata which consist of regolith, fresh basement rock and coal seams.

Groundwater seeps from the Permian strata and overburden areas into the pit. The final void at end of mining is predicted to act as a groundwater sink with a lake level predicted to develop below the regional water table. Therefore, any saline water within the final void will not flow into surrounding groundwater systems.

BMC maintains a groundwater monitoring program to detect any significant changes to the local groundwater resources and to monitor any impacts of the development on groundwater. This monitoring network assists BMC to identify impacts associated with seepage from water storages and emplacement areas.

Should the groundwater monitoring program identify the occurrence of a trigger BMC will initiate an investigation.

3.2.2.12 Contaminated Land

Land contamination may occur as a result of hydrocarbon or other chemical spills. Bengalla minimises risk to the environment from contaminated land with the implementation of procedures. Control measures include:

- A chemical approval process.
- Focus on waste management and recycling.
- Prompt spill response and remediation.
- Bunding and containment.
- Site contaminated land register.
- Use of external contaminated land consultants to decommission contaminated sites.
- Operation of a bioremediation facility where soil contaminated with hydrocarbons is placed for remediation.

3.2.2.13 Greenhouse Gasses, Methane Drainage and Venting

Mining involves using energy to move large volumes of earth and coal. Energy use and fugitive emission form a large proportion of Bengalla's greenhouse gas contribution. Fugitive emissions of carbon dioxide and methane naturally occur in coal seams and are released to the atmosphere during the mining process. By moving material efficiently, energy use and greenhouse gas emissions are reduced.

3.2.2.14 Blasting

BMC has in place procedures and standards for blasting which:

- Describe the measures that would be implemented to ensure compliance with blast criteria and operating conditions.
- Require blasts to be designed using techniques to contain the blast and minimise overpressure, vibration and fume, consistent within criteria including:
 - Identification of infrastructure within 500 metres of the blast;
 - Maximum instantaneous charge contained to a level so that blasting that will comply with the criteria; and
 - Stemming, a delay detonation system, careful drilling and hole loading per the blast design.
- A blast monitoring program that uses blast monitors to evaluate the performance of the development against the blasting criteria with the blast monitors recording the following characteristics for each blast and then relaying the information to BMC;
 - Time and date;
 - Peak vector sum (mm/s);
 - Air blast overpressure peak;
 - Waveform trace, where applicable.
 - Compliance with the blasting operating conditions.
- Defines what constitutes a blasting incident and includes a protocol for identifying and notifying regulators and relevant stakeholders of any blasting incidents. Where monitoring results are below the blast criteria, no further action is required and results are reported with no additional analysis. Where results are above the blast criteria the following analysis will be used to determine if BMC's activities exceeded the criteria or contributed to an exceedance of the criteria:
 - Confirm that the monitoring results are valid and attributable to a BMC blast; and

- Investigate the meteorological data for the relevant period and the design of the blast.
- Assessment of the blast in accordance with the incident reporting procedure.

Periodic review of blast management practices to evaluate performance and identify responsive action or system improvements are undertaken as required.

3.2.2.15 Noise

BMC has committed to minimising the environmental impacts from its operations, using proactive and reactive control measures and monitoring tools. The control measures are designed to minimise the generation of noise and where reasonable and feasible enable effective control of noise. Bengalla comprises the following operating areas and infrastructure:

- Open cut mining area.
- ROM pad and Coal Handling and Preparation Plant.
- Rail load-out facility.

Noise can be emitted from mobile or fixed plant which can affect the acoustic environment within and surrounding Bengalla.

General noise mitigation measures which are utilised to control noise generation are:

- Operation and maintenance of a real-time noise monitoring system which provides feedback regarding Bengalla's acoustic performance and allows equipment to be positioned to avoid excessive noise at receivers.
- Review of local forecasted meteorology to predict potential noise enhancing conditions and to allow planning of operations.
- Maintenance of the existing data link from the weather monitoring station to allow informed decisions to be made regarding appropriate equipment operating locations.
- Consideration of noise impacts during risk assessments and change in management procedures.
- Provision of noise awareness training to employees.
- Regular independent compliance attended noise monitoring surveys at representative private receiver locations.

Where noise monitoring identifies noise exceeding the noise criterion or trigger levels Bengalla will implement appropriate reasonable and feasible noise mitigation measures.

3.2.2.16 Visual and Lighting

To manage any offsite lighting impacts various management techniques may be utilised, including:

- Light casing, direction assessment and consideration of light source observable off site monitored.
- Visual bunds established to improve the visual amenity of the site.
- Training and awareness initiatives;

3.2.2.17 Heritage (European and Aboriginal)

All known aboriginal artefacts have been salvaged within the SSD-5170 (as modified) disturbance boundary.

Two areas of European heritage significance are the Bengalla homestead (c1877) and Overdene property (c1860). In addition to these homesteads, Bengalla will continue to perform maintenance on a number of other heritage areas on its landholdings including the Keys Family Cemetery and Overton homestead.

3.2.2.18 Bushfires

The objectives of bushfire management at Bengalla are to minimise the risk of bushfires and control outbreaks should they occur. Bengalla has a number of measures in place for the prevention and control of bushfires which include periodically slashing roadsides verges, maintaining tree-lot undergrowth areas free of grass and fuel build-up and grazing of pastures. A fully equipped mobile fire-fighting unit, along with a fleet of five water carts are also on hand should a bushfire occur at Bengalla.

3.2.2.19 Public Safety

In the context of this MOP, public safety at Bengalla relates to access to the operation from public roads. The open-cut operation is fenced, gated and signposted at the boundary perimeter to prevent trespassers from accessing the mine.

4 Post Mining Land Use

4.1 Regulatory Requirements

The regulatory requirements specific to post mining land use at Bengalla are summarised in Table 13 and Table 14. Each table also indicates where each is addressed in this MOP

The conditions provided in the mining leases apply only to the land within each lease. The conditions provided in the Development Consent apply to the land within the approved operations

Table 13: Mining Lease Requirements

Reference	Requirement	MOP Section
ML 1450, Condition 8	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder.	2.3.8,5, 6 and 7
ML 1450, Condition 9	Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this authority or any renewal thereof, the lease holder shall remove from such surface such buildings, machinery, plant, equipment, constructions and works as may be directed by the Minister and such surface shall be rehabilitated and left in a clean, tidy and safe condition to the satisfaction of the Minister.	2.3.7, 2.3.8, 5, 6, 7 and Table 18
ML 1450, Condition 10	If so directed by the Minister, the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder.	2.3.8, 5, 6 and 7
ML 1469, Condition 21	If so directed by the Minister the lease holder shall rehabilitate to the satisfaction of the Minister any lands within the subject area which may have been disturbed by the lease holder.	2.3.8, 5, 6 and 7
ML 1469, Condition 22	Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this authority or any renewal thereof, the lease holder shall remove from such surface such buildings, machinery, plant, equipment, constructions and works as may be directed by the Minister and such surface shall be rehabilitated and left in a clean, tidy and safe condition to the satisfaction of the Minister.	2.3.7, 2.3.8, 5, 7 and Table 18
ML 1469, Condition 23	If so directed by the Minister, the lease holder shall rehabilitate to the satisfaction of the Minister and within such time as may be allowed by the Minister any lands within the subject area which may have been disturbed by mining or prospecting operations whether such operations were or were not carried out by the lease holder.	2.3.8, 5, 6 and 7
ML1397, ML 1711, ML 1728, ML 1729, Condition 2	Rehabilitation Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.	2.3.8,5 6 and 7

<p>ML1397, ML 1711, ML 1728, ML 1729, Condition 3</p>	<p>Mining Operations Plan and Annual Rehabilitation Report</p> <p>(a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.</p> <p>(b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:</p> <ul style="list-style-type: none"> (i) identifies areas that will be disturbed; (ii) details the staging of specific mining operations, mining purposes and prospecting; (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use; (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and (v) reflects the conditions of approval under: <ul style="list-style-type: none"> • the <i>Environmental Planning and Assessment Act 1979</i>; • the <i>Protection of the Environment Operations Act 1997</i>; and • any other approvals relevant to the development including the conditions of this mining lease. <p>(c) The MOP must be prepared in accordance with the ESG3: Mining Operations Plan (MOP) Guidelines September 2013 published on the Department's website at www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-andforms/pgf/environmental-guidelines</p> <p>(d) The lease holder may apply to the Minister to amend an approved MOP at any time.</p> <p>(e) It is not a breach of this condition if:</p> <ul style="list-style-type: none"> (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the <i>Environmental Planning and Assessment Act 1979</i>, the <i>Protection of the Environment Operations Act 1997</i>, the <i>Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002</i> and <i>Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006</i> or the <i>Work Health and Safety Act 2011</i>; and (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out. <p>(f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:</p> <ul style="list-style-type: none"> (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP; (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment. <p><i>Note: The Rehabilitation Report replaces the Annual Environmental Management Report.</i></p>	<p>This Document</p>
<p>ML1397, Condition 4</p>	<p>Non-Compliance Reporting</p> <p>(a) The lease holder must notify the Department upon becoming aware of any breaches of the conditions of this mining lease or breaches of the Mining Act or Regulations;</p> <p>(g) Notifications under condition 4(a) must be provided in the form specified on the Department's website within seven (7) days of the mining lease holder becoming aware of the breach.</p>	<p>11.4</p>

ML 1711, ML 1728, ML 1729, Condition 4	<p>Compliance Report</p> <p>(a) The lease holder must submit a Compliance Report to the satisfaction of the Minister. The report must be prepared in accordance with any relevant guidelines or requirements published by the Minister for compliance reporting.</p> <p>(b) The Compliance Report must include:</p> <ul style="list-style-type: none"> (i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with; (ii) particulars of any non-compliance with any such conditions or provisions, (iii) the reasons for any such non-compliance; (iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance. <p>(c) The Compliance Report must be lodged with the Department annually on the grant anniversary date for the life of this mining lease.</p> <p>(d) In addition to annual lodgement under condition 4(c) above, a Compliance Report:</p> <ul style="list-style-type: none"> (i) must accompany any application to renew this mining lease under the Act; (ii) must accompany any application to transfer this mining lease under the Act; and (iii) must accompany any application to cancel, or to partially cancel, this mining lease under the Act. <p>(e) Despite the submission of any Compliance Report under (c) or (d) above, the titleholder must lodge a Compliance Report with the Department at any date or dates otherwise required by the Minister.</p> <p>(f) A Compliance Report must be submitted one month prior to the expiry of this mining lease, where the licence holder is not seeking to renew or cancel this mining lease.</p>	11
ML1397, Condition 5	<p>Environmental Incident Report</p> <p>The lease holder must provide environmental incident notifications and reports to the Secretary no later than seven (7) days after those environmental incident notifications and reports are provided to the relevant authorities under the Protection of the Environment Operations Act 1997.</p>	11.1 and 11.4
ML 1711, ML 1728, ML 1729, Condition 5	<p>Environmental Incident Report</p> <p>(a) The lease holder must notify the Department of all:</p> <ul style="list-style-type: none"> (i) breaches of the conditions of this mining lease or breaches of the Act causing or threatening material harm to the environment; and (ii) breaches of environmental protection legislation causing or threatening material harm to the environment (as defined in the Protection of the Environment Operations Act 1997), arising in connection with significant surface disturbing activities, including mining operations, mining purposes and prospecting operations, under this mining lease. The notification must be given immediately after the lease holder becomes aware of the breach. <p>Note. Refer to www.resources.nsw.gov.au/environment for notification contact details.</p> <p>(b) The lease holder must submit an Environmental Incident Report to the Department within seven (7) days of all breaches referred to in condition 5(a)(i) and (ii). The Environmental Incident Report must include:</p> <ul style="list-style-type: none"> (i) the details of the mining lease; (ii) contact details for the lease holder; (iii) a map identifying the location of the incident and where material harm to the environment has or is likely to occur; (iv) a description of the nature of the incident or breach, likely causes and consequences; 	11.1 and 11.4

	<p>(v) a timetable showing actions taken or planned to address the incident and to prevent future incidents or breaches referred to in 5(a).</p> <p>(vi) a summary of all previous incidents or breaches which have occurred in the previous 12 months relating to significant surface disturbing activities, including mining operations, mining purposes and prospecting operations under this mining lease.</p> <p>Note. The lease holder should have regard to any relevant Director General's guidelines in the preparation of an Environmental Incident Report. Refer to www.resources.nsw.gov.au/environment for further details.</p> <p>In addition to the requirements set out in conditions 5(a) and (b), the lease holder must immediately advise the Department of any notification made under section 148 of the Protection of the Environment Operations Act 1997 arising in connection with significant surface disturbing activities including mining operations, mining purposes and prospecting operations, under this mining lease.</p>	
ML 1397 Condition 8	<p>Group Security The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future. The amount of the security deposit to be provided as a group security has been assessed by the Minister at \$80,560,000. The leases covered by the group security include: Mining Lease 1397, 1450, 1469, 1711, 1728 and 1729 (Act 1992)</p>	1.5.5
ML 1711 Condition 8	<p>Group Security The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future. The amount of the security deposit to be provided as a group security has been assessed by the Minister at \$49,100,000. The leases covered by the group security include: Mining Lease 1397 (Act 1992), Mining Lease 1450 (Act 1992), Mining Lease 1469 (Act 1992) and Mining Lease 1592 (Act 1992) This group security is extended to apply to this lease.</p>	1.5.5
ML 1728, ML 1729, Condition 8	<p>Group Security The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future. The amount of the security deposit to be provided as a group security has been assessed by the Minister at \$73,300,300. The leases covered by the group security include: Mining Leases 1397, 1450, 1469 and 1592 (Act 1992) This group security is extended to apply to this lease.</p>	1.5.5
ML1397, ML 1711, ML 1728, ML 1729, Condition 9	<p>Cooperation Agreement The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:</p> <ul style="list-style-type: none"> • access arrangements • operational interaction procedures • dispute resolution • information exchange • well location • timing of drilling • potential resource extraction conflicts; and • rehabilitation issues. 	Various agreements are in place.

4.2 Rehabilitation Management Plan Requirements

The specific requirements for the RMP are provided in Schedule 3, Conditions 44 to 46 of SSD-5170 as modified and are listed in Table 14. Table 14 also shows where each requirement is addressed within this MOP.

Bengalla's construction schedule, as outlined in Table 12 of the Bengalla EIS, indicates the relocation of a section of the Bengalla Link Road will occur at approximately Year 13 and the future re-instatement of Dry Creek is not proposed until after Year 15. These activities are therefore not within the current MOP period and have not been included in this version of the MOP. Detailed final void requirements will also be included in a future revision to this MOP.

Table 14: Development Consent Requirements for Rehabilitation

Condition	Requirement of Schedule 3 of SSD-5170 (as modified)	MOP Section										
Schedule 2, Condition 5	<p>LIMITS ON CONSENT Mining Operations The Applicant may carry out mining operations on the site until 28 February 2039.</p> <p><i>Note: Under this consent, the Applicant is required to rehabilitate the site and perform additional undertakings to the satisfaction of either the Secretary or the DRG. Consequently this consent will continue to apply in all other respects other than the right to conduct mining operations until the rehabilitation of the site and these additional undertakings have been carried out satisfactorily.</i></p>	Title Block										
Condition	Requirement of Schedule 3 of SSD-5170 (as modified)	MOP Section										
44	<p>Rehabilitation Objectives The Applicant must rehabilitate the site to the satisfaction of the DRG. The rehabilitation must comply with the objectives in Table 15 and be consistent with the conceptual final landform plan shown in Appendix 9. <i>Table 15: Rehabilitation Objectives</i></p> <table border="1"> <thead> <tr> <th>Feature</th> <th>Objective</th> </tr> </thead> <tbody> <tr> <td>Mine site (as a whole)</td> <td> <ul style="list-style-type: none"> Safe, stable and non-polluting 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 </td> </tr> <tr> <td>Overburden Emplacement Area – exposed to Muswellbrook and Denman</td> <td> <ul style="list-style-type: none"> Rehabilitate the entire face with high density woody vegetation as soon as practicable following the completion of mining operations </td> </tr> <tr> <td>Final void</td> <td> <ul style="list-style-type: none"> Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void Minimise the greatest extent practicable: <ul style="list-style-type: none"> the size and depth of the final void the drainage catchment of the final void any high wall instability risk 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 </td> </tr> <tr> <td>Agricultural land</td> <td> <ul style="list-style-type: none"> Restore or maintain land capability generally as described in the EIS and shown conceptually in Appendix 9 </td> </tr> </tbody> </table>	Feature	Objective	Mine site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non-polluting 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 Area – exposed to Muswellbrook and Denman	<ul style="list-style-type: none"> Rehabilitate the entire face with high density woody vegetation as soon as practicable following the completion of mining operations 	Final void	<ul style="list-style-type: none"> Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void Minimise the greatest extent practicable: <ul style="list-style-type: none"> the size and depth of the final void the drainage catchment of the final void any high wall instability risk 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 	Agricultural land	<ul style="list-style-type: none"> Restore or maintain land capability generally as described in the EIS and shown conceptually in Appendix 9 	This document and section 4.4
	Feature	Objective										
	Mine site (as a whole)	<ul style="list-style-type: none"> Safe, stable and non-polluting 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 Area – exposed to Muswellbrook and Denman	<ul style="list-style-type: none"> Rehabilitate the entire face with high density woody vegetation as soon as practicable following the completion of mining operations 										
	Final void	<ul style="list-style-type: none"> Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void Minimise the greatest extent practicable: <ul style="list-style-type: none"> the size and depth of the final void the drainage catchment of the final void any high wall instability risk 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 										
Agricultural land	<ul style="list-style-type: none"> Restore or maintain land capability generally as described in the EIS and shown conceptually in Appendix 9 											
		5.2 and 6.1										
		5.1.2.4, 6.1 and 7.2.4.3										
		Not required in this MOP period (General information on final void is provided in Sections 5.1.2.1 and 6.1)										
		5.2 and 6.1										

Condition	Requirement of Schedule 3 of SSD-5170 (as modified)	MOP Section
	<p>Revegetation areas</p> <ul style="list-style-type: none"> Restore a minimum 10% treed coverage at the mine site Higher density planting along the riparian zone of the Dry Creek reinstatement, and around the final void 	5.2 and 6.1
	<p>Dry Creek reinstatement</p> <ul style="list-style-type: none"> No net loss of creek length Restore, maintain and/or improve hydrological and ecological function, quality and geomorphic stability Incorporate erosion control measures based on vegetation and engineering revegetations Revegetate with suitable native species 	<p>Not required in this MOP period.</p> <p>(General information is provided in sections 5.1.2.5, 6.1 and 7.2.4.4)</p>
	<p>Surface infrastructure</p> <ul style="list-style-type: none"> To be decommissioned and removed, unless DRG agrees otherwise 	2.3.7, 5.3.1 and 6.1
	<p>Community</p> <ul style="list-style-type: none"> Ensure public safety Minimise the adverse socio-economic effects associated with mine closure 	1.5, 1.5.1 and 4.5
45	<p>Progressive Rehabilitation</p> <p>The Applicant must carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance (particularly on the face of emplacements that are visible off-site). Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation.</p> <p><i>Note: It is accepted that parts of the site are progressively rehabilitated may be subject to further disturbance in future.</i></p>	2.3.8
46	<p>Rehabilitation Management Plan</p> <p>The Applicant must prepare and implement a Rehabilitation Management Plan for the development to the satisfaction of the DRG. This plan must:</p> <p>(a) be submitted to the DRG for approval within 6 months of the date of this consent;</p> <p>(b) be prepared in consultation with the Department, DoI, OEH, Council and the CCC;</p> <p>(c) be prepared in accordance with relevant DRG guidelines;</p> <p>(d) describe how the rehabilitation of the site would be integrated with the implementation of the biodiversity offset strategy;</p> <p>(e) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, including over the long term following completion of mining operations, and triggering remedial action (if necessary);</p> <p>(f) describe the design specifications and measures that would be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform including final voids, and final land use;</p> <p>(g) include interim rehabilitation where necessary to minimise the area exposed for dust generation;</p> <p>(h) include a research program that seeks to improve the understanding and application of rehabilitation techniques and methods in the Hunter Valley;</p> <p>(i) include a schedule for establishment of native vegetation corridors and habitat linkages across the site;</p> <p>(j) include a landscape management plan for the proposed Bengalla Link Road realignment;</p> <p>(k) include a plan for the reinstatement of Dry Creek including:</p> <ul style="list-style-type: none"> detailed design specifications for the reinstatement of the creek; a schedule of works describing how the reinstatement work would be staged and integrated with mining operations and the final landform; a revegetation program; 	<p>This document</p> <p>1.5.3</p> <p>1.5.3</p> <p>1</p> <p>1.3</p> <p>6</p> <p>This document</p> <p>5.1.1.6</p> <p>9</p> <p>Not required in this MOP period as outlined in section 7.2.4.5</p> <p>Not required in this MOP period as outlined in section 4.2</p> <p>Not required in this MOP period as outlined in section 4.2 and 7.2.4.4</p>

Condition	Requirement of Schedule 3 of SSD-5170 (as modified)	MOP Section
	<ul style="list-style-type: none"> o hydrological, ecological and geomorphic performance and completion criteria for the reinstated creek based on the assessment of baseline conditions; and o a program to monitor, maintain and/or improve the hydrological and ecological function, quality and geomorphic stability of the reinstated creek; 	
	(l) include a program to monitor, independently audit and report on the effectiveness of the measures, and progress against the detailed performance and completion criteria; and	8 and 11
	(m) build to the maximum extent practicable on other management plans required under this consent.	1.3
	The Applicant must implement the management plan as approved by the Secretary.	This document
Appendix 9 Conceptual Final Landform		Plan 4

4.3 Post Mining Land Use Goals

In accordance with the conditions SSD-5170 as modified, Bengalla is required to address all aspects of rehabilitation, including the development of post mining land use objectives and the implementation of measures to achieve such objectives.

The overarching goal of the Bengalla rehabilitation program is to develop a safe, stable and non-polluting landscape that aligns to the mine’s approvals. This will be achieved by the development of an undulating, free draining post mining landform (**excluding final void**) that is consistent with the surrounding environment. The majority of the post mining landform will support a mixture of native woody vegetation and pastures suitable for grazing.

The face of the OEA that is exposed to Muswellbrook and Denman will be rehabilitated with **HDWV**. The goal of this rehabilitation domain is to address issues pertaining to visual amenity for the towns of Muswellbrook and Denman. In context of land use, these areas will be used as habitat corridors for native fauna.

The future reinstatement of Dry Creek **is per Bengalla EIS**.

These post mining land use goals have been nominated as **reasonable and feasible** practices on the rehabilitated landform considering:

- Slope, land class, soil types and water requirements.
- Community and stakeholder **consultation**.

- Health and safety considerations.
- Regulatory requirements.
- Contribution to the local economy and employment.

The conceptual final rehabilitated landform design and land use domains are provided on Plan 4.

Rehabilitation areas will be monitored to ensure that rehabilitation objectives are being met and that the revegetation and long term landform suitability is achieved.

4.4 Rehabilitation Objectives

The rehabilitation objectives for the project are described in Schedule 3 Condition 44 of SSD-5170 as modified, which has been listed in section 4.1. The rehabilitation objectives for the Domains that have been defined in this MOP are provided in Section 5.2

4.5 Community Issues associated with Mine Closure

BMC will **review** relevant information in relation to community issues associated with mine closure presently anticipated in 2039.

5 Rehabilitation Planning

5.1 Domain Selection

Primary domains are defined as land management units within the mine site, usually with unique operational and functional purpose. Secondary domains are land management units characterised by a similar post mining land use objective.

Domains for Bengalla have been determined in consideration of the and local environment. The key domains for Bengalla, as shown in **PLAN2, PLAN3Series and PLAN4**, and are outlined in Table 15. Further details are provided in Section 2.2

Table 15: Bengalla Primary and Secondary Domains

Code	Primary Domain (Operational)	Code	Secondary Domain (Post Mining Land Use)
6	Active Void	I	Final Void
3	Water Management	K	Rehabilitation Area – Class III Pasture
1	Infrastructure	D	Rehabilitation Area – Pasture
4	Overburden Emplacement Area	E	Rehabilitation Area – HDWV
5	Topsoil Stockpiles	L	Rehabilitation Area – Dry Creek Reinstatement
10	Temporary Stabilisation	M	Tree Restoration Areas

Further information on these domains is provided in the following sections. It should be noted that Primary Domains will change in both area and shape as the mine progresses whereas the Secondary Domains will remain the same based on the Post Mining Land Use. Typically a unit of land that is planned to be mined may cycle through several primary domains before it finishes up with a secondary domain when it is rehabilitated. An example of this is:

- 1- The Land unit may start off as either infrastructure or water management.
- 2- As mining approaches it, it will become an active void when it is mined through.
- 3- Then once mined will become an Overburden emplacement area.
- 4- It may then become a topsoil stockpile on the overburden once final landform is reached.
- 5- When it's operational requirement is complete it will transition into a secondary domain to become rehabilitated.

The secondary domains have been designed to exist over the majority of the lease area, although if the land has not been disturbed for the purposes of mining it will not be classed as rehabilitation and therefore not be required to meet the associated completion criteria. The Bengalla Homestead area has been excluded from the secondary domains due to its heritage listing.

There will be blending between domains where different vegetation species are listed. This is to be expected and will be monitored through rehabilitation monitoring programs and if required changed through a MOP **application**.

5.1.1 Primary Domains

5.1.1.1 Domain 6 - Active Void

There will be one main active void during the MOP period and an additional satellite pit that will be developed ahead of mining. The satellite pit will be merged back into the main void over the MOP period. The main active void is defined by the active highwall/extraction area where mining occurs, is aligned generally north-south, has a strike length of approximately 3.0km and moves westward as mining progresses.

5.1.1.2 Domain 3 - Water Management

Water Management areas include the network of dams, pipes, pumps, drains, levees and diversions that compose the Bengalla water management system.

5.1.1.3 Domain 1 - Infrastructure

Infrastructure areas assist in the mining process and are largely split into either the Mine Infrastructure Area (MIA) where mostly permanent infrastructure is, and in-pit infrastructure that moves around as the mine progresses. The main infrastructure items are listed in section 2.2.

5.1.1.4 Domain 4 - Overburden Emplacements Areas

OEA store the waste rock and reject material (placed into cells and capped) created during the mining process to uncover coal. The OEA extends westerly filling the Void created by mining. Once the OEA has reached the designed final landform height and there is no longer a need for the space operationally, the rehabilitation process can commence.

5.1.1.5 Domain 5 - Topsoil and Clay Stockpiles

Stockpiles are created when topsoil and clay are stripped from mining areas and cannot be utilised immediately in the rehabilitation process.

5.1.1.6 Domain 5 – Temporary Stabilisation

Areas of temporary rehabilitation may be required due to operational requirements. These areas are temporarily stabilised to minimise visual and dust impacts.

5.1.2 Secondary Domains

5.1.2.1 Domain I - Final Void

The Final Void is the open pit left at mine closure. Defined by a single void, its modelled long term water level is 70RL at 1000 years, and will have sufficient freeboard and as such, will not require a spillway as it is not free draining. It will be created in 2039 which is the expiry of the Development Consent. The void will be aligned generally north-south and will have a strike length of approximately 3.0km.

The currently approved location of the final void is at the limit of approved open cut mining and has no alternate location. However, recoverable coal reserves have been identified to the west of currently approved mining operations at Bengalla. Should Bengalla be granted approval to continue mining to uncover these reserves, the location of the final void will change.

All slopes will be battered back to ensure long term geotechnical stability. Surface water drainage on and over the low-wall will be minimised through the construction of drainage control structures to divert as much of the catchment as possible away from the final void and back into the surface water system.

5.1.2.2 Domain K – Rehabilitation Area – Class III Pasture

Class III Pasture is a small domain on the top of the OEA. This domain has minimal slopes, and was created from soils recovered from the Southern Overburden Emplacement Area (SOEA) as approved in Modification 4 of the development consent DA211/93.

5.1.2.3 Domain D - Rehabilitation Area - Pasture

Class IV and V Pasture areas cover the majority of the Post Mining Landform. Pasture areas will be reconstructed from the pasture species list is found in **section 7.2.4.2**. Native vegetation (selected from the HDWV Domain) will be included in the Pasture areas to create biodiversity connectivity through native vegetation corridors as well as windbreaks and wood lots for stock shelter.

5.1.2.4 Domain E - Rehabilitation Areas – High Density Woody Vegetation

This domain is the HDWV area required for the eastern face of the OEA and will consist of HDWV with pasture. This design will allow for both visual amenity and a productive land use to be achieved on the eastern OEA.

The seed mix used for this domain can be found in Section 7.2.4.3.

5.1.2.5 Domain L - Rehabilitation Areas – Dry Creek Reinstatement

The Dry Creek reinstatement domain will reinstate areas of Dry Creek similar to the original Dry Creek.

5.1.2.6 Domain M – Tree Restoration Areas

The requirements for tree corridors and tree restoration areas as indicated in SSD-5170 as modified

and in the Bengalla EIS.

5.2 Domain Rehabilitation Objectives

The primary domains identified in Section 5.1 are defined in Table 16 and have been adapted from relevant approvals documentation (including SSD-5170 as modified, Bengalla EIS, SEE MOD1-MOD4, mining leases, etc.). Primary Domains are operational and do not form part of the post mining land use, therefore only secondary domains will have rehabilitation objectives.

Table 16: Rehabilitation Objectives

Domain	Objective
<i>Primary Domains</i>	
Domain 6 - Active Void	<ul style="list-style-type: none"> Infrastructure decommissioned and rehabilitated to the relevant Secondary Domain Objectives
Domain 3 - Water Management	<ul style="list-style-type: none"> Selected infrastructure decommissioned and rehabilitated to the relevant Secondary Domain Objectives
Domain 1 - Infrastructure Areas	<ul style="list-style-type: none"> Infrastructure decommissioned and rehabilitated to the relevant Secondary Domain Objectives
Domain 4 - Overburden Emplacement Areas	<ul style="list-style-type: none"> Infrastructure decommissioned and rehabilitated to the relevant Secondary Domain Objectives
Domain 5 - Topsoil and Clay Stockpiles	<ul style="list-style-type: none"> Infrastructure decommissioned and rehabilitated to the relevant Secondary Domain Objectives
Domain 10 – Temporary Stabilisation	<ul style="list-style-type: none"> Infrastructure decommissioned and rehabilitated to the relevant Secondary Domain Objectives
<i>Secondary Domains</i>	
All Secondary Domains	<ul style="list-style-type: none"> Safe, stable and non-polluting. 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. Ensure public safety. Minimise the adverse socio-economic effects associated with mine closure.

Domain	Objective
Domain I – Final Void	<ul style="list-style-type: none"> • Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void • Minimise the greatest extent practicable: <ul style="list-style-type: none"> ○ the size and depth of the final void ○ the drainage catchment of the final void ○ any high wall instability risk ○ 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 • Higher density plantings around the final void
Domain K – Rehabilitation Area – Class III Pasture	<ul style="list-style-type: none"> • Landform suitable to establish Class III pasture lands. • Growth medium is suitable for establishment of Class III Pastures. • Sustainable vegetation cover suitable for Class III Pastures. • Vegetation includes a range of species suitable for Class III Pastures.
Domain D - Rehabilitation Area – Class IV and V Pasture	<ul style="list-style-type: none"> • Landform suitable to establish Class IV-V pasture lands. • Growth medium is suitable for establishment of Class IV-V pasture lands. • Sustainable vegetation cover suitable for Class IV-V pasture lands. • Vegetation includes a range of species suitable for Class IV-V pasture.
Domain E – Rehabilitation Area – HDWV	<ul style="list-style-type: none"> • Landform suitable to establish Class IV-V HDWV vegetation. • Growth medium is suitable for establishment of HDWV interspersed with areas of pasture. • Sustainable vegetation cover suitable for HDWV interspersed with areas of pasture. • Vegetation includes a range of species suitable for Class IV-V HDWV vegetation. • Provides visual amenity for the towns of Muswellbrook and Denman.
Domain L – Rehabilitation Area – Dry Creek Reinstatement	<ul style="list-style-type: none"> • Higher density planting along the riparian zone. • No net loss of creek length. • Restore, maintain and/or improve hydrological and ecological function, quality and geomorphic stability. • Incorporate erosion control measures. • Revegetate with suitable native species.
Domain M – Tree Restoration Areas	<ul style="list-style-type: none"> • Specific rehabilitation conditions are met per SSD-5170 as modified , the Bengalla EIS and SEE MOD1-MOD4.

5.3 Rehabilitation Phases

The rehabilitation objective at Bengalla is for the post-mining land use to be compatible with surrounding land uses and provide environmental and community benefits. This will be achieved through a series of conceptual phases which are described as:

- Phase 1 – Decommissioning.
- Phase 2 – Landform Establishment.
- Phase 3 – Growth Medium Development.
- Phase 4 – Ecosystem and Land Use Establishment.
- Phase 5 – Ecosystem and Land Use Sustainability.
- Phase 6 – Relinquishment.

5.3.1 Decommissioning

Decommissioning is the first phase of rehabilitation initiated when an operational activity in a given area is complete and transition **occurs** from a primary domain into a secondary domain. The performance indicators and completion criteria as it relates to the Decommissioning Stage are outlined in Table 18.

5.3.2 Landform Establishment

Landform Establishment is the process to achieve a stable final landform. Completion criteria relevant to Landform Establishment Stage are provided in Table 18.

The **conceptual mining and rehabilitation** for Bengalla during the life of the MOP are shown on **PLANS 3A – 3E** inclusive. The **conceptual** final landform and land-use at closure and completion of rehabilitation are shown in **Plan 4**.

5.3.3 Growth Medium Development

Growth Medium Development Performance indicators and completion criteria are provided in Table 20.

5.3.4 Ecosystem and Land-use Establishment

Ecosystem and Land-use Establishment performance indicators and completion criteria are provided in Table 21.

5.3.5 Ecosystem and Land-use Sustainability



Ecosystem and Land-use Sustainability performance indicators and completion criteria are provided in Table 21.

5.3.6 Relinquishment

Relinquishment is achieved once completion criteria for Phase 5 – Ecosystem and Land-use Sustainability have been completed. No areas of the Mining Leases are planned to be relinquished during the life of this MOP.

5.3.7 Rehabilitation Phases at the end of the MOP

Table 17: Summary of rehabilitation phases proposed for completion at the end of the MOP

Rehabilitation Phase \ Domain	I - Final Void	K – Rehabilitation Area – Class III Pasture	D – Rehabilitation Area – Class IV and V Pasture	E – Rehabilitation Area – HDWV	L – Rehabilitation Area – Dry Creek Reinstatement	M – Tree Restoration Areas
Phase 0 Active Mining Area	x	✓	x	✓	x	N/A
Phase 1 Decommissioning	x	✓	x	✓	x	N/A
Phase 2 Landform Establishment	x	✓	x	✓	x	N/A
Phase 3 Growth Medium Development	x	✓	x	✓	x	N/A
Phase 4 Ecosystem and Land Use Establishment	x	✓	x	x	x	x
Phase 5 Ecosystem and Land Use Sustainability	x	✓	x	x	x	x
Phase 6 Relinquished Lands	x	x	x	x	x	x
 = Complete,  = not complete.						

Note: Most of rehabilitation domains in the table above are not shown as being progressed through the phases until mining is complete since these domains exist over the entire final landform. This should not be confused with the actual progression of rehabilitation which can be seen in the PLAN 3 Series.

6 Performance Indicators and Completion Criteria

6.1 Completion Criteria

Performance indicators and completion criteria have been developed for each secondary domain. This information is presented in Table 18, Table 19, Table 20, Table 21, Table 22, and Table 23.

The performance indicators and completion criteria are provided as a guide and have not been developed or designed to form a framework for the purpose of assessing compliance. A **Trigger Action Response Plan** (TARP) has been developed to manage risk, **see Section 10.2**.

Table 18: Decommissioning Phase

Phase 1 – Decommissioning								
Objective	Performance Indicator	Completion Criteria	Monitoring Methodology	Monitoring Frequency	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains								
Infrastructure to be decommissioned and removed.	Disconnection of services (Including power, communications and water).	Services Disconnected	Decommissioning Report; Service Provider communication.	At time of decommissioning; Prior to rehabilitation.	ML1397, Condition 3; ML1450, Condition 9; ML1469, Condition 22; SSD-5170, Schedule 2 Condition 12; SSD-5170, Schedule 3 Condition 44; NEPM Guidelines for the NSW Site Auditor Scheme; Bengalla EIS.	No	1	Not Started
	Removal of Infrastructure (Including roads, rail, conveyors, buildings, hardstands and stockpiles).	Infrastructure removed	Decommissioning Report; Service Provider communication.	At time of decommissioning; Prior to rehabilitation.		No	1	Not Started
	Mobile Equipment Demobilised (Including trucks, excavators, dragline, dozers, light vehicles, water and fuel trucks, graders.).	Mobile Equipment removed from site	Transportation and demobilisation documentation.	At time of decommissioning; Prior to rehabilitation.		No	1	Not Started
Safe and non-polluting.	Hazardous substances identified and removed utilising a hazardous material assessment.	Hazardous materials removed	Contamination report; Soil and Water Testing; Certificates for removal; Waste material tracked.	At time of decommissioning; Prior to rehabilitation.	ML1397, Condition 3; ML1450, Condition 9; ML1469, Condition 22; SSD-5170, Schedule 2 Condition 12; SSD-5170, Schedule 3 Condition 44; NEPM Guidelines for the NSW Site Auditor Scheme; Bengalla EIS.	No	1	Not Started
	Contaminated land identified and remediated.	Contaminated land remediated in accordance with relevant procedures and guidelines.	Contamination report; Soil and water testing; Rehabilitation inspection.	At time of decommissioning; Prior to rehabilitation.		No	1	Not Started
	Problematic materials encapsulated: (Including PAF waste, carbonaceous material and reject material)	Problematic materials encapsulated in OEA under at least 5m of inert material.	Mine planning compliance.	During mining; At time of decommissioning; Prior to rehabilitation.		No	1	Not Started

Table 19: Landform Establishment

Phase 2 – Landform Establishment								
Objective	Performance Indicator	Completion Criteria	Monitoring Methodology	Monitoring Frequency	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains								
Safe and non-polluting.	Hazardous or problematic materials.	No hazardous or problematic materials (ie. waste, carbonaceous material or reject material) identified.	Visual Inspections; Rehabilitation monitoring.	Annually.	SSD-5170, Schedule 3 Condition 44; Bengalla EIS.	No	1	Ongoing
Incorporation of micro-relief and integration with surrounding landforms.	Landform.	Landform compliant with approved landform design.	Survey design compliance	At time of installation.	SSD-5170 Schedule 3 Condition 44.	No	2,4,25	Ongoing
Incorporation of drainage lines.	Water / sediment management structures incorporated into landform.	Water / sediment management structures installed as per design.	Survey design compliance	At time of installation.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44; "Blue Book".	No	2,4, 26	Ongoing
Landform suitable to establish approved post mining land use.	Size of surface rocks.	Rocks >200mm removed or placed into habitat piles at intervals no greater than 1 pile / 10ha. Rock pile to be <1.5m high.	Visual Inspections; Rehabilitation monitoring.	Post topsoil spreading, prior to soil cultivation and seeding; Annually.	Bengalla EIS. SSD-5170 Schedule 3 Condition 44;	No	3	Ongoing
Domain I Final Void								
Safe and stable	Barrier restricts access	Barrier present along the length of the final highwall.	Visual inspection; Rehabilitation monitoring.	At time of installation; Annually.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44;	No	7	Not Started
	Stable gradient	Void angles where practicable: <ul style="list-style-type: none"> Lowwall 10°-21° Highwall 23°-25° Endwall approx. 33° 	Survey design compliance.	Prior to Growth Medium Development phase	Bengalla EIS; SSD-5170 Schedule 3 Condition 44;	No	2,4	Not Started

Minimise, as far as practicable the drainage catchment of the final void.	Landform minimises surface water catchment in the final void.	Water management measures divert surface water away from the final void.	Survey design compliance; Rehabilitation monitoring.	After Landform Establishment phase; Annually.	SSD-5170 Schedule 3 Condition 44;	No	2,4	Not Started
Final void designed as a long term groundwater sink and to maximise groundwater flows to the void.	Landform design	Landform compliant with the hydrological modelling landform design.	Survey design compliance.	After Landform Establishment phase.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44;	No	2,4	Not Started
	Number of final voids	1 void present at completion of mining.	Survey design compliance.	After Landform Establishment phase.	Bengalla EIS	No	2	Not Started
Domain K Rehabilitation – Class III Pasture								
Landform suitable to establish Class III pasture	Slope	Slope 3 to <10% or 1 to 3% where slopes > 500m in length	Survey design compliance.	Prior to Growth medium Development phase.	NSW Office of Environment and Heritage (Oct 2012) The Land and Soil Capability scheme – 2 nd Approximation	Yes	2	Complete
	Micro-relief	Soil surface undulation ±2m from design	Survey design compliance.	Prior to Growth medium Development phase.	NSW Office of Environment and Heritage (Oct 2012) The Land and Soil Capability scheme – 2 nd Approximation	Yes	2	Complete
Domain D Rehabilitation – Class IV & V Pasture								
Landform suitable to establish Class IV-V pasture	Slope	Slopes 10-20%	Survey design compliance.	Prior to Growth medium Development phase.	NSW Office of Environment and Heritage (Oct 2012) The Land and Soil Capability scheme – 2 nd Approximation	No	2	Not started
	Micro-relief	Soil surface undulation ±2m from design	Survey design compliance.	Prior to Growth medium Development phase.	NSW Office of Environment and Heritage (Oct 2012) The Land and Soil Capability scheme – 2 nd Approximation	No	2	Not started

Domain E Rehabilitation – High Density Woody Vegetation								
Landform suitable to establish HDWV	Slope	Slopes 10-20%	Survey design compliance.	Prior to Growth medium Development phase.	NSW Office of Environment and Heritage (Oct 2012) The Land and Soil Capability scheme – 2 nd Approximation	No	2	Ongoing
	Micro-relief	Soil surface undulation ±2m from design	Survey design compliance.	Prior to Growth medium Development phase.	NSW Office of Environment and Heritage (Oct 2012) The Land and Soil Capability scheme – 2 nd Approximation	No	2	Ongoing
Domain L Rehabilitation – Dry Creek Re-instatement								
No net loss of creek length	Channel length meets design criteria in the EIS.	4500 m	Survey design compliance.	Prior to Growth Medium Development phase.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44;	No	2	Not Started
Restore hydrological function and geomorphic stability	<ul style="list-style-type: none"> • Base Width • Lowflow channel slope • Lowflow channel depth • Highflow channel slope • Highflow channel depth • Mannings n • Channel Slope 	<ul style="list-style-type: none"> • 8m • 1V:4H • 0.77m • 1V:10H • Variable • 0.04 • Varies 	Survey design compliance.	Prior to Growth Medium Development phase.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44;	No	2	Not Started
Incorporate erosion control measures	Rock scour protection	Rock scour protection implemented where velocity > 2m/s for 1 in 50 ARI event.	Survey design compliance.	Prior to Growth Medium Development phase.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44;	No	2	Not Started

Table 20: Growing Media Development

Phase 3 – Growth Medium Development								
Objective	Performance Indicator	Completion Criteria	Monitoring Methodology	Monitoring Frequency	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains								
Safe and non-polluting.	Hazardous or problematic materials.	No hazardous or problematic materials (ie. waste, carbonaceous material or reject material) identified.	Visual Inspections; Rehabilitation monitoring.	Annually	SSD-5170 Schedule 3 Condition 44; Bengalla EIS.	No	1	Ongoing
Soil/growth medium chemical and physical properties suitable to establish approved post mining land use.	pH	5.5 < pH < 8.2	Soil testing by NATA-accredited laboratory; Rehabilitation Monitoring.	Prior to topsoil spreading (i.e. at stockpile stage); Annually.	Burns 2005; Hazelton & Murphy 2007.	No	5	Ongoing
	Electrical Conductivity (i.e. salinity)	<2.0 dS/m				No	5	Ongoing
	Exchangeable Sodium Percentage (i.e. sodicity)	<10%				No	5	Ongoing
	Cation Exchange Capacity (CEC) and exchangeable cations	<ul style="list-style-type: none"> CEC: 12-40 meq/100g Calcium: 65-80% of CEC Magnesium: 10-15% of CEC Potassium: 1-5% of CEC Sodium: 0-1% of CEC Aluminium: <5% of CEC 		No	5	Ongoing		
	Appropriate use of ameliorants	Soil test results and records of application.	Soil test results; Application records.	Per use	Bengalla EIS	No	5	Ongoing
	Surface preparation to minimise erosion and maximise water infiltration	Surface cultivated along contour.	Visual inspections	Prior to seeding	Bengalla EIS	No	23	Ongoing
Domain K Rehabilitation – Class III Pasture								

Growth medium suitable to establish Class IV-V pasture	Topsoil thickness	400mm Black Vertosols	Topsoil inventory; Rehabilitation monitoring.	After Landform Establishment phase; Annually.	GSSE Report September 2012 – Class III Land Rehabilitation; Bengalla Pro-0618 Topsoil stripping procedure for Southern out of pit emplacement area.	Yes	6	Complete
	Subsoil thickness	500mm Black Vertosols				Yes	6	Complete
Domain D Rehabilitation – Class IV & V Pasture								
Growth media suitable to establish Class IV & V Pasture	Growth medium thickness	≥100mm over area	Visual inspections; Topsoil inventory; Rehabilitation monitoring.	After Landform Establishment phase; Annually.	Bengalla EIS	No	6	Not started
Domain E Rehabilitation – High Density Woody Vegetation								
Seedbed preparation suitable to establish HDWV	Coarse ripping depth	≥300mm over area approx..	Visual inspections; Rehabilitation monitoring.	After Landform Establishment phase; Annually.	Bengalla EIS MOD2 SEE	No	6	Ongoing
Domain L Rehabilitation – Dry Creek Re-instatement								
Restore hydrological function and geomorphic stability	Extent of clay fill layer meets the EIS design criteria.	2m thick select clay fill layer for the length of the alignment	Construction inspection report.	During construction.	Bengalla EIS SSD-5170 Schedule 3 Condition 44;	No	5	Not started
	Clay stabilisation as per the EIS design criteria.	Top 300mm of clay layer with 2% gypsum	Construction inspection report.	During construction.	Bengalla EIS SSD-5170 Schedule 3 Condition 44;	No	6	Not started

Table 21: Ecosystem and Land Use Establishment

Phase 4 – Ecosystem and Land Use Establishment								
Objective	Performance Indicator	Completion Criteria	Monitoring Methodology	Monitoring Frequency	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains								
Safe, stable and non-polluting.	No uncontrolled Access	Demarcation present and access restricted.	Rehabilitation monitoring	Annually	Bengalla EIS	No	7	Ongoing
	Stability	No visible signs of instability (slumping/ cracks).	Geotechnical inspections / monitoring; Rehabilitation monitoring.	As required; Annually.	Bengalla EIS	No	4	Ongoing
	Erosion	No erosion rills or gullies >30cm in depth and no evidence of tunnel erosion.	Rehabilitation monitoring.	Annually.	Bengalla EIS; Australian Soil and Land Survey Field Handbook (CSIRO, 2009).	No	23	Ongoing
	Integrity and functionality of water/sediment management structures	No evidence of active erosion within the water/sediment management structures.	Rehabilitation monitoring.	Annually.	Bengalla EIS	No	23	Ongoing
	Water storages	Water storages in the vicinity of the rehabilitation area no longer receive water that has accumulated within, or drained from, active mining and infrastructure areas and any other areas where run-off may have or has come into contact with coal or carbonaceous material.	Visual inspection; Rehabilitation monitoring.	At time of change; Annually.	Bengalla EIS	No	18	On going
	Hazardous or problematic materials.	No hazardous or problematic materials (ie. waste, carbonaceous material or reject material) identified.	Visual Inspections; Rehabilitation monitoring.	Annually	Bengalla EIS	No	1	Ongoing

Landform to be in keeping with the natural terrain features of the surrounding landscape.	Biodiversity Connectivity	A maximum of 3km spacing between large patches of trees (area ≥ 10 ha with 75% tree coverage) and 60-80m spacing between small patches of trees (area between 1 and 10ha with 3-4 trees per Ha).	Rehabilitation monitoring; GIS / Aerial photograph interpretation.	Annually	Bengalla EIS	No	9,25	Ongoing
	Visual screening of drainage structures	Trees are developing in or around drainage structures.	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS	No	9,25	Ongoing
Established ecosystem is suitable for agreed post mining land use.	Habitat potential	Presence of habitat features (eg. nest boxes, boulders and large logs) on rehabilitated areas.	Visual inspections; Rehabilitation monitoring.	Prior to seeding; Annually.	Bengalla EIS	No	14	Ongoing
	Nutrient cycling	Monitoring indicates accumulation of surface organic litter over time.	Rehabilitation monitoring	Annually	Bengalla EIS	No	8,9	Ongoing
	Weed incidence	$\leq 20\%$ projected weed coverage per hectare.	Rehabilitation monitoring	Annually	Bengalla EIS; Bengalla Biodiversity Management Plan; SSD-5170 Schedule 3 Condition 29.	No	11	Ongoing
		Weed control focuses on noxious species and on those species that are not deemed as preferred, palatable and productive pasture species.	Weed control records	Ongoing	Bengalla EIS; Bengalla Biodiversity Management Plan; SSD-5170 Schedule 3 Condition 29.	No	11	Ongoing
	Weed incidence	No species with known toxicities to grazing stock.	Rehabilitation monitoring	Annually	Burns, M 2015	Yes	11	Ongoing
Feral pest incidence	Monitoring indicates no increase in feral pest population and species diversity.	Rehabilitation monitoring	Annually	Bengalla Biodiversity Management Plan; SSD-5170 Schedule 3 Condition 29; Bengalla EIS.	No	12,13	Ongoing	
Domain I Final Void								

Safety	Barrier restricts access	Barrier present along the length of the final highwall.	Visual inspection; Rehabilitation monitoring.	At time of installation; Annually.	Bengalla EIS; SSD-5170 Schedule 3 Condition 44.	No	7	Not Started
Vegetation cover suitable for end land use	Ground cover	95% projected vegetative cover per hectare.	Rehabilitation Monitoring	Annual	Bengalla EIS	No	3,4,8,9	Not Started
High density plantings around the final void.	Stem Density	Presence of higher density plantings around void crest. <ul style="list-style-type: none"> ≥1000 stems/ha – year 1 ≥500 stems /ha – year 5 ≥400 stems/ha – year 10 	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition; 44 SSD-5170 Appendix 9;	No	9,25	Not Started
Domain K Rehabilitation – Class III Pasture								
Vegetation cover suitable for pasture land use	Ground cover	≥ 70% projected vegetative cover per hectare.	Rehabilitation monitoring	Annually	Burns, M 2015	Yes	9	Complete
	Species diversity	Presence of at least 3 grasses and 3 legumes from the species mix relevant to the domain.	Rehabilitation monitoring	Annually	Burns, M 2015	Yes	9	Complete
Domain D Rehabilitation – Class IV & V Pasture								
Vegetation cover suitable for pasture land use	Ground cover	≥ 70% projected vegetative cover per hectare.	Visual inspections; Rehabilitation monitoring.	Annually	Burns, M 2015	No	9	Not started
	Species diversity	Presence of at least 3 grasses and 3 legumes from the species mix relevant to the domain.	Visual inspections; Rehabilitation monitoring.	Annually	Burns, M 2015	No	9	Not started
Minimum 10% treed coverage	Tree coverage	At least 10% tree coverage.	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition 44.	No	9,25	Not started
Domain E Rehabilitation – High Density Woody Vegetation								

Establishment of a sustainable vegetation cover aligned with final land use	Ground cover	≥ 90% projected vegetative cover per hectare.	Visual inspections; Rehabilitation monitoring.	Annually	Bengalla EIS	No	8,9,17	Ongoing
	Species Diversity	Species establishing are aligned to those included in species mix for the domain.	Seed mix; Rehabilitation monitoring.	Annually	Bengalla EIS	No	9,25	Ongoing
Rehabilitate with HDWV	Establishment of HDWV	Minimum stem densities for seeded areas: <ul style="list-style-type: none"> • ≥1000 stems/ha – year 1 • ≥500 stems /ha – year 5 • ≥400 stems/ha – year 10 	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition 44; Burns, M 2015.	No	9,25	Ongoing
Domain L Rehabilitation – Dry Creek Re-instatement								
Revegetate with suitable native species	Presence of River Red Gums	Visual evidence of River Red Gums.	Rehabilitation monitoring	Annually	Bengalla EIS	No	9,25	Not started
	Species Diversity	Species establishing are aligned to those included in species mix for the domain.	Rehabilitation monitoring	Annually	Bengalla EIS	No	9,25	Not started
High density plantings around the Dry Creek reinstatement	Stem Density	Presence of higher density plantings around the Dry Creek reinstatement: <ul style="list-style-type: none"> • ≥1000 stems/ha – year 1 • ≥500 stems /ha – year 5 • ≥400 stems/ha – year 10 	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition 44; Burns, M 2015.	No	9,25	Not started
Domain M Rehabilitation – Tree Restoration								
Mine-owned riparian areas of Dry Creek that were not affected by the disturbance will also be rehabilitated.	Planting of the regionally endangered population River Red Gum	Visual evidence of River Red Gums.	Rehabilitation monitoring	Annually	Bengalla EIS	No	9	Not started

Table 22: Ecosystem and Land use Sustainability

Phase 5 – Ecosystem and Land Use Sustainability								
Objective	Performance Indicator	Completion Criteria	Monitoring Methodology	Monitoring Frequency	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains								
Safe, stable and non-polluting.	No uncontrolled Access	Demarcation present and access restricted.	Rehabilitation monitoring	Annually	Bengalla EIS	No	7	Ongoing
	Stability	No visible signs of instability (slumping/ cracks)	Rehabilitation monitoring	Annually	Bengalla EIS	No	4	Ongoing
	Erosion	No erosion rills or gullies >30cm in depth and no evidence of tunnel erosion.	Rehabilitation monitoring	Annually	Bengalla EIS; Australian Soil and Land Survey Field Handbook (CSIRO, 2009).	No	23	Ongoing
	Integrity and functionality of water/sediment management structures.	No evidence of active erosion within the water/sediment management structures.	Rehabilitation monitoring	Annually	Bengalla EIS	No	23	Ongoing
	Water storages	Water storages in the vicinity of the rehabilitation area no longer receive water that has accumulated within, or drained from, active mining and infrastructure areas and any other areas where run-off may have or has come into contact with coal or carbonaceous material.	Visual inspection; Rehabilitation monitoring.	At time of change; Annually.	Bengalla EIS	No	18	Ongoing
	Hazardous or problematic materials.	No hazardous or problematic materials (ie. waste, carbonaceous material or reject material) identified.	Visual Inspections; Rehabilitation monitoring.	Annually	Bengalla EIS	No	1	Ongoing
	Water Quality	Water quality is suitable for stock watering purposes: pH 6.5-8.5; TSS < 4500mg/L; and EC 0-7800 µS/cm.	Water quality monitoring	Annually	Water for livestock: interpreting water quality tests - Primefact 533 (DPI, 2014)	No	18	Ongoing

Landform to be in keeping with the natural terrain features of the surrounding landscape.	Biodiversity Connectivity	A maximum of 3km spacing between large patches of trees (area \geq 10ha with 75% tree coverage) and 60-80m spacing between small patches of trees (area between 1 and 10ha with 3-4 trees per Ha).	Rehabilitation monitoring; GIS / Aerial photograph interpretation.	Annually	Bengalla EIS	No	9,25	Ongoing
	Visual screening of drainage structures	Drainage structures are screened by trees and/or other vegetation.	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS	No	9,25	Ongoing
Established ecosystem is suitable for agreed post mining land use.	Habitat potential	Presence of habitat features (eg. nest boxes, boulders and large logs) on rehabilitated areas.	Visual inspections; Rehabilitation monitoring.	Annually	Bengalla EIS	No	14	Ongoing
	Habitat augmentation	Presence of mammal and avian activity.	Rehabilitation Monitoring	Annually	Bengalla EIS	No	14	Ongoing
	Nutrient cycling	Surface organic litter present across rehabilitated areas.	Rehabilitation monitoring.	Annually	Bengalla EIS	No	8,9	Ongoing
	Weed incidence	\leq 15% projected weed coverage per hectare.	Rehabilitation monitoring.	Annually	Bengalla EIS; Bengalla Biodiversity Management Plan; SSD-5170 Schedule 3 Condition 29.	No	11	Ongoing
		Weed control focuses on noxious species and on those species that are not deemed as preferred, palatable and productive pasture species.	Weed control records	Ongoing	Bengalla EIS; Bengalla Biodiversity Management Plan; SSD-5170 Schedule 3 Condition 29.	No	11	Ongoing
	Feral pest incidence	Monitoring indicates no increase in feral pest population and species diversity.	Rehabilitation monitoring; Feral pest surveys.	Annually	Bengalla Biodiversity Management Plan; SSD-5170 Schedule 3 Condition 29; Bengalla EIS.	No	12,13	Ongoing
Ecosystem development	Evidence of reproductive material on mature long lived vegetation and/or presence of	Rehabilitation Monitoring.	Annually	Burns, M 2015; Bengalla EIS.	No	5,8,9,17	Not Started	

		second generation seedlings from long lived species.						
		Evidence of reproductive material on mature short lived vegetation and/or presence of second generation seedlings from short lived species.	Rehabilitation Monitoring.	Annually	Burns, M 2015; Bengalla EIS.	No	5,8,9,17	Not Started
	Ecosystem resilience	Recruitment rates are equal or exceed mortality rates.	Rehabilitation Monitoring.	Annually	Bengalla EIS.	No	9	Not Started
Domain I Final Void								
Safe and stable	Barrier restricts access	Barrier present along the length of the final highwall.	Visual inspection; Rehabilitation Monitoring.	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition 44.	No	7	Not Started
Vegetation cover suitable for end land use	Ground cover	95% projected vegetative cover per hectare.	Rehabilitation Monitoring	Annual	Bengalla EIS	No	3,4,8,9	Not Started
High density plantings around the final void	Stem Density	Stem densities around void crest maintained at ≥ 400 stems/ha.	Rehabilitation monitoring	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition 44; SSD-5170 Appendix 9;	No	9,25	Not Started
Domain K Rehabilitation – Class III Pasture								
Vegetation cover suitable for pasture land use	Ground cover	$\geq 70\%$ projected vegetative cover per hectare.	Rehabilitation monitoring	Annually	Burns, M 2015	Yes	9	Complete
	Weed incidence	No species with known toxicities to grazing stock.	Rehabilitation monitoring	Annually	Burns, M 2015	No	11	On going
	Species diversity	Presence of at least 3 grasses and 3 legumes from the species mix relevant to the domain.	Rehabilitation monitoring	Annually	Burns, M 2015	Yes	10	Complete
Minimise the adverse socio-economic effects associated with mine closure	Grazing Productivity	Pasture productivity comparable to regional averages.	Rehabilitation monitoring; Grazing trials (to be determined).	Annually or as determined by grazing trials design	Bengalla EIS; 'Beef stocking rate and farm size' NSW DPI 2006	No	24	On going
Domain D Rehabilitation – Class IV & V Pasture								

Vegetation cover suitable for pasture land use	Ground cover	≥ 70% projected vegetative cover per hectare.	Rehabilitation monitoring	Annually	Bums, M 2015	No	9	Not Started
	Weed incidence	No species with known toxicities to grazing stock.	Rehabilitation monitoring	Annually	Bums, M 2015	No	11	Not Started
	Species diversity	Presence of at least 3 grasses and 3 legumes from the species mix relevant to the domain.	Rehabilitation monitoring	Annually	Bums, M 2015	No	10	Not Started
Minimum 10% treed coverage	Tree coverage	At least 10% tree coverage.	Rehabilitation monitoring; GIS / Aerial photography interpretation.	Annually	Bengalla EIS; SSD-5170 Schedule 3 Condition 44.	No	9,25	Not Started
Minimise the adverse socio-economic effects associated with mine closure	Grazing Productivity	Pasture productivity comparable to regional averages	Rehabilitation monitoring; Grazing trials (to be determined).	Annually or as determined by grazing trials design	Bengalla EIS; 'Beef stocking rate and farm size' NSW DPI 2006.	No	24	Not Started
Domain E Rehabilitation – High Density Woody Vegetation								
Establishment of a sustainable vegetation cover aligned with final land use	Ground cover	≥ 90% projected vegetative cover per hectare.	Rehabilitation monitoring	Annually	Bengalla EIS	No	8,9,17	Ongoing
	Species Diversity	Species establishing are aligned to those included in species mix for the domain.	Rehabilitation monitoring	Annually	Bengalla EIS	No	10,25	Ongoing
Rehabilitate with HDWV	Stem Density	Stem densities maintained at ≥ 400 stems/ha.	Rehabilitation Monitoring	Annually	Bums, M 2015	No	5,8,9,17	Not Started
Domain L Rehabilitation – Dry Creek								
Revegetate with suitable native species	Presence of River Red Gums	Visual evidence of River Red Gums.	Rehabilitation monitoring	Annually	Bengalla EIS	No	9,25	Not Started
	Species Diversity	Species establishing are aligned to those included in species mix for the domain.	Rehabilitation monitoring	Annually	Bengalla EIS	No	9,25	Not Started

High density plantings around the Dry Creek reinstatement	Stem Density	Stem densities maintained at \geq 400 stems/ha.	Rehabilitation Monitoring	Annual	Bums, M 2015	No	5,8,9,17	Not Started
Domain M Rehabilitation – Tree Restoration								
Mine-owned riparian areas of Dry Creek that were not affected by the disturbance will also be rehabilitated.	Planting of the regionally endangered population River Red Gum	Visual evidence of River Red Gums.	Rehabilitation monitoring	Annually	Bengalla EIS	No	9	Not Started

Table 23: Land Relinquishment

Phase 6 – Land Relinquishment								
Objective	Performance Indicator	Completion Criteria	Monitoring Methodology	Monitoring Frequency	Justification/Source	Complete (Yes/No)	Link to TARP	Progress at start of MOP
All Domains								
Land Relinquishment	Compliance to criteria in Phases 1-5	Demonstrated compliance to Criteria	Relinquishment report	Prior to relinquishment	EGS03 Mining Operations Plan (MOP) Guidelines	No	25	Not Started

7 Rehabilitation Implementation

7.1 Status at MOP Commencement

The Domain status and the activities that have occurred up to the commencement of the MOP are described below, and can be seen on **PLAN 2**.

The areas of each Domain at the commencement and completion of the MOP can be found in section 7.3, Table 29.

Table 24: Rehabilitation Status of Bengalla defined Domains

Code	Primary Domain (Operational)	Status at Start of MOP	Rehabilitation Activities to date
6	Active Void	Active	N/A
3	Water Management	Active	N/A
1	Infrastructure	Active	N/A
4	Overburden Emplacement Area	Active	N/A
5	Topsoil and Clay Stockpiles	Active	N/A
10	Temporary Stabilisation	Active	N/A
Code	Secondary Domain (Post Mining Land Use)		
I	Final Void	Inactive	This domain will not become active until mining is complete.
K	Rehabilitation Area – Class III Pasture	Active	This domain is currently in the ecosystem and land use establishment phase.
C	Rehabilitation Area – Pasture	Active	This domain is not yet present on site as the existing areas of pasture are now required to be converted to HDWV.
E	Rehabilitation Area – HDWV	Active	Trials have been commenced to ascertain the most appropriate revegetation techniques to convert unsuccessful HDWV rehabilitation areas and existing pasture areas to HDWV. Existing areas of HDWV will be left in situ and will be maintained as required.
L	Rehabilitation Area – Dry Creek Reinstatement	Inactive	This domain will not become active for approximately 15 years.
M	Tree Restoration Areas	Inactive	This domain is currently inactive.

7.2 Proposed Rehabilitation Activities during the MOP Term

The proposed rehabilitation activities during the MOP term will concentrate on rehabilitating the OEA as soon as practicable, and continuing to progress the existing rehabilitation through the phases. These activities can be seen in the **PLAN 3 Series** and include:

- Ground disturbance.
- Landform establishment.
- Growth medium development.
- Ecosystem and land use establishment.
- Planting of tree screens.
- Rehabilitation monitoring.
- Rehabilitation maintenance.

7.2.1 Ground Disturbance

Bengalla's Biodiversity Management Plan describes how cleared vegetation is managed. Weed control ahead of mining will assist in topsoil management once cleared. Where appropriate, identified salvage items and habitat trees may be collected and used for habitat in rehabilitation and non-disturbed areas, as directed by the Environmental **Superintendent** or delegate. Vegetation or rocks, not required for rehabilitation purposes may be pushed on to the pre-strip area for removal with the overburden. Ground cover species will be recovered with the topsoil **where reasonable and feasible**. Where possible native seed will be collected as per the Biodiversity Management Plan.

7.2.2 Landform Establishment

Emplacement areas are progressively rehabilitated. The majority of the north, eastern and southern faces have been rehabilitated, with active mining on the western face filling in behind the mining void.

Bengalla has a range of material wastes that are disposed of in the OEA. ARD and reject materials are placed below the final landform and are covered with at least a 5m layer of inert material. Material that is to be placed near the final surface is reviewed for physical properties, **e.g.** large rocks and visual aesthetic.

The landform is initially dumped to design in lifts of approximately 7m in height to allow for encapsulation of rejects and for cut and fill to establish the final surface.

Once bulk reshaping is completed, the landform may be deep-ripped. The ripping loosens near surface layers within the landform that has been compacted during placement, aiding root penetration during vegetation establishment. Then final trim **undertaken which**, smooths out wash-outs and gullies, rough edges, temporary access tracks, local steep slopes and prepares the surface for revegetation.

Rock-raking is then undertaken. Rocks greater than 200mm in diameter may be removed or left in groups on the surface as fauna habitat. Raking **generally** leaves cultivated surface that minimises the risk of erosion until vegetation can be established.

Rehabilitation where reasonable and feasible will no longer utilise contour banks and straight line drop structures to manage water, but will incorporate fluvial geomorphology design influences (Geofluv). Figure 4 below is a concept example of the Geofluv landform surface that is a design showing natural micro-relief and natural drainage lines



Figure 4: Concept example of Geofluv landform.

7.2.3 Growth Medium Development

A soil and land capability impact assessment was completed as part of the Bengalla EIS. This assessment described soil types, suitability and recommended stripping depths and how these vary across site. The soils at Bengalla have a moderate erosion risk and require careful management. The subsoils are undesirable for topsoil use due to physical and/or chemical limitations, however their use may be considered where weed infestation mitigates the use of topsoil material.

The overburden varies in physical and geochemical properties, in accordance with the geology of the area and exposure to weathering. Chemical analyses of Bengalla spoil materials indicate that, in general, the overburden is slightly sodic and alkaline, but within acceptable ranges for use as a plant growth medium.

Soil analysis **as required** will be undertaken prior to use to determine suitable ameliorants for revegetation. Soil amelioration and treatment requirements may include the use of gypsum, bio solids **or similar** to improve soil condition.

The growth medium will be spread across the final landform to the appropriate coverage. Where required, rock raking will be undertaken, to manage exposed rocks larger than 200mm in size. The area **may** then be cultivated to assist in seed germination and water infiltration.

Seeding and or tube stock planting of HDWV species may occur directly into spoil and or topsoil. This practice is common throughout the Hunter Valley open cut coal mines.

7.2.4 Ecosystem and Land-Use Establishment

Ecosystem and Land-Use Establishment will be undertaken as soon as practical after the completion of Growth Media Development phase.

7.2.4.1 Domain K – Pasture Class III

The primary revegetation works have been completed on this Domain. Maintenance works will be undertaken as identified by the rehabilitation monitoring program and as per the TARP.

7.2.4.2 Domain D – Pasture Classes IV and V

Where available, stockpiled habitat features will be spread across the rehabilitation area following the Growth Medium Development phase and prior to seeding. The habitat features will be placed in loose piles to create habitat mounds.

Pasture areas (Classes IV and V) will be fertilised and sown with the selected seed as soon as practical after the completion of Growth Media Development. Pasture is preferably sown in Autumn when there is reliable seasonal rain with cooler growing conditions. A typical species list for the establishment of pastures for a post-mining grazing land use is provided in Table 25.

This species list aims to establish a vegetation cover for surface stability and to reduce the risk of erosion whilst providing a plant community suitable of sustaining cattle. This mix may be subject to change due to seed availability, success rate or monitoring data from Bengalla and the wider industry.

During Ecosystem and Land-Use Establishment, cattle may be introduced to these pasture areas to enhance nutrient cycling via consumption of grown feed, production of manure and the trampling and incorporation of plant material (green and dead) into the surface layer.

Table 25 Pasture Rehabilitation Species

Species	Rate Kg/ha
Native grass mix (including all or a combination of: <i>Austrostipa scabra</i> , <i>Bothriochloa macra</i> , <i>Chloris ventricosa</i> , <i>Microlaena stipoides</i> and <i>Themeda australis</i>)	0.5
Couch	2
Phalaris	4
Ryegrass	4
Green Panic	5
Sub clover	6
Haifa white clover	2
Woolly Pod Vetch	4
Barrel medic	5
Lucerne	5
Millet (September to January) or Oats (March to July)	20
Fertiliser –Starter 15 (or equivalent)	125

Treed coverage will be created as scattered tree plots throughout the pasture domain for the creation of wind breaks and shelter for stock and as vegetation corridors to connect with the surrounding landscape. The preferred method of revegetation is direct seeding. Tubestock planting may also be used as a supporting revegetation method to assist in achieving completion criteria. The species mix for the treed areas will be consistent with that used for the HDWV Domain as listed in Table 26.

7.2.4.3 Domain E - High Density Woody Vegetation

Where available, stockpiled habitat features will be spread across the rehabilitation area following the Growth Medium Development phase and prior to seeding. Habitat features will be placed in loose to create habitat mounds. Placement of habitat features is planned around growth medium to minimise compaction and surface disturbance.

The HDWV species mix is based on the locally occurring Grey Box – Ironbark Woodland and Ironbark – Spotted Gum – Grey Box Woodland vegetation communities, and utilises species that are known to grow on post mined lands in the Hunter Valley. The preferred method of revegetation is direct seeding and or tube stock planting (excluding track and drains).

Swales capture water and soil during rain events and provide favourable growing conditions. Deep rooted trees and shrubs are generally not desirable on the swales as their root system can create pathways for water infiltration through the banks. Swales will be sown with the pasture mix listed in Table 27.

If an area becomes available for Ecosystem and Land-Use Establishment out of season, the area will be initially sown with a temporary cover crop of either Millet (September to January) or Oats (March to July) or similar. When the conditions are suitable for the HDWV species the cover crop will be cultivated into the growth medium and the HDWV species mix will be sown. Incorporating the cover crop into the growth media will enhance soil organics and other beneficial processes.

The HDWV species mix includes cover crop species which provide initial ground cover and stability prior to the establishment of the native species. Cover crop species are designed to be functional but not competitive with the native species.

Fertiliser in the HDWV species mix will be minimised due to inherent risk of increased exotic species colonising these areas as a result of the increased nutrients. An inert bulking agent may be included in the species mix to assist in the even distribution of seed.

The HDWV species mix and nominated application rates may be subject to change due to seed availability, success rate, monitoring data and trial outcomes. The HDWV species mix is shown in Table 26.

Table 26 Direct Seeding mix – High Density Woody Vegetation

Species	Rate in kg / ha
<i>Corymbia maculata</i> (Spotted gum)	0.8
<i>Eucalyptus crebra</i> (Narrow-leaved ironbark)	0.8
<i>Eucalyptus fibrosa</i> (Broad leaf ironbark)	0.2
<i>Eucalyptus moluccana</i> (Grey box)	0.8
<i>Eucalyptus tereticornis</i> (Forest red gum) or <i>E. blakelyi</i> (Blakely's redgum)	0.2
<i>Acacia decora</i> (Western silver wattle)	0.3

Species	Rate in kg / ha
<i>Acacia decurrens</i> (Black Wattle)	0.2
<i>Acacia falcata</i> (Sickle wattle)	0.2
<i>Acacia parvipinnula</i> (Silver-stemmed Wattle)	0.2
<i>Acacia implexa</i> (Hickory wattle)	0.2
<i>Acacia salicina</i> (Native willow)	0.5
<i>Daviesia ulicifolia</i> (Gorse bitter pea) or <i>D. genistifolia</i> (Broom Bitter Pea)	0.2
<i>Dodonaea viscosa</i> (Sticky hop-bush)	0.3
<i>Hardenbergia violaceae</i> (False Sarsaparilla)	0.1
Native grass mix (including all or a combination of: <i>Austrostipa scabra</i> , <i>Bothriochloa macra</i> , <i>Chloris ventricosa</i> , <i>Microlaena stipoides</i> and <i>Themeda australis</i>)	0.5
<i>Cynodon dactylon</i> (Couch)	0.5
Total	6.0
Millet or Oats	5.0

The seed mix as provided in Table 27 is to be used on contour crests and banks in the HDWV Domain.

Table 27 Seeding Mix – Swales

Species	Rate Kg/ha
Couch	5
Green Panic	4
Sub clover	3
Barrel medic	3
Millet (September to January) or Oats (March to July)	20

7.2.4.4 Domain L - Dry Creek Reinstatement

Bengalla's construction schedule, as outlined in Table 12 of the Bengalla EIS, indicates that the reinstatement of Dry Creek is not proposed until after Year 15. Therefore, this activity is not within the current MOP period and is not described in this MOP.

7.2.4.5 Domain M – Tree Restoration

This activity is not within the current MOP period and is not described in this MOP.

7.2.5 Rehabilitation Monitoring and Maintenance

Rehabilitation monitoring begins once initial rehabilitation works are complete and is undertaken through to land relinquishment to ensure the successful progression of rehabilitation through the domain phases. Rehabilitation monitoring is discussed further in Section 8.

Rehabilitation maintenance is a function of either the rehabilitation methodology or is triggered through the monitoring program. The TARP, discussed in Section 9, details mitigation and maintenance measures for responding to unexpected variations or impacts to rehabilitation.

Typical maintenance activities at Bengalla focus on erosion control, weed and pest management and revegetation progress. Maintenance for erosion control can sometimes be required around the edges of new rehabilitation areas where the current dump is intersected and in drainage structures that have not stabilised with vegetation.

Weeds on rehabilitated areas can limit native plant growth. Where weeds establish in rehabilitation areas remedial work is required. Infested areas may be incorporated into targeted programs to reduce the impact of weeds and achieve rehabilitation objectives.

Revegetation maintenance may also be undertaken as a result of realignment between existing and new secondary domains that have changed due to the approval of SSD-5170 as modified, or where HDVV has not established in sufficient densities.

7.2.6 Disturbance and Rehabilitation Progression during the term of the MOP

Table 28: Disturbance and Rehabilitation Progression during the term of the MOP

YEAR	Total Disturbance Area (Ha)	Total Rehabilitation Area (Ha) (Per MOP Year)*	Cumulative Rehabilitation Area*	Comments/Explanation
(Dec 2016)	986		208	
1 (2017)	1187	24	231	South Face
2 (2018)	1220	13	245	South Face and Starting Visual Relief
3 (2019)	1276	23	267	South Face and Visual Relief
4 (2020)	1368	38	306	South Face, North Face and Visual Relief
End of MOP 5 (2021)	1368	33	339	South Face, North Face and Visual Relief

Note: Areas presented in the table are approximate only.

* Total Rehabilitation Area includes areas of land which are within the following phases: Landform Establishment and Growth Medium Development, Ecosystem and Land Use Establishment, and Ecosystem and Land Use Sustainability. Disturbance includes non-relinquished rehabilitated lands.

7.3 Summary of Rehabilitation Areas during the MOP Term

The table below summarises the change in domain and associated phase of rehabilitation during the MOP period. At Bengalla, the following Domain progressions occur:

- The active mine void heads west and generally increases in size over time due to the increasing strip length and reduction in highwall angle. The mine void generally consumes infrastructure areas ahead of mining and is then converted to overburden emplacement once the basal seam is mined;
- Water management areas will vary over time but generally increase proportionally to the OEA;
- Before they become part of the active mine, infrastructure areas will generally remain the same but will increase slowly as production increases or pit geometry changes (i.e. Dry Creek infrastructure); and
- The active OEA may increase or decrease depending on dumping sequence and ability to convert from an active dump to a Rehabilitation Domain. Rehabilitation areas should increase with time unless dehabilitation is required.

Table 29: Rehabilitation Data Table

Primary Domain	Secondary Domain	Code (Plan legend)	Rehabilitation Phase	Dec 2016 (Ha)	Year 1 2017 (Ha)	Year 2 2018 (Ha)	Year 3 2019 (Ha)	Year 4 2020 (Ha)	Year 5 2021 (Ha)
Domain 6 – Active Void									
6	.	6	Active	235	223	208	195	194	187
Domain 3 – Water Management									
3	.	3	Active	31	120	118	98	98	95
Domain 1 – Infrastructure									
1	.	1	Active	237	246	260	301	361	335
Domain 4 – Overburden Emplacement									
4	.	4	Active	233	228	266	292	287	285
Domain 5 – Topsoil Stockpiles									
5	.	5	Active	24	75	79	79	85	85
Domain 10 – Temporary Stabilisation									
10	.	10	Active	18	64	43	43	42	41
Total –Primary Domains				778	956	975	1008	1067	1028
Domain I – Final Void									
.	Final Void (I)	I	Decommissioning	0	0	0	0	0	0
.	Final Void (I)	I	Landform Establishment	0	0	0	0	0	0
.	Final Void (I)	I	Growth Medium Development	0	0	0	0	0	0
.	Final Void (I)	I	Ecosystem Establishment	0	0	0	0	0	0
.	Final Void (I)	I	Ecosystem Development	0	0	0	0	0	0
.	Final Void (I)	I	Relinquished Lands	0	0	0	0	0	0
.	Final Void (I)	I	Total	0	0	0	0	0	0

Domain K – Rehabilitation Area – Class III Pasture									
	Rehabilitation Area – Class III Pasture (K)	K	Decommissioning	0	0	0	0	0	
			Landform Establishment	0	0	0	0	0	
			Growth Medium Development	0	0	0	0	0	
			Ecosystem Establishment	5.7	5.7	5.7	5.7	5.7	
			Ecosystem Development	0	0	0	0	0	
			Relinquished Lands	0	0	0	0	0	
			Total	5.7	5.7	5.7	5.7	5.7	
Domain D – Rehabilitation Area – Class IV & V Pasture									
	Rehabilitation Area – Class IV & V Pasture (D)	D	Decommissioning	0	0	0	0	0	
			Landform Establishment	0	0	0	0	0	
			Growth Medium Development	0	0	0	0	11.7	30.0
			Ecosystem Establishment	0	0	0	0	0	11.7
			Ecosystem Development	0	0	0	0	0	0
			Relinquished Lands	0	0	0	0	0	0
			Total	0	0	0	0	11.7	37.5
Domain E – Rehabilitation Area – High Density Woody Vegetation									
	Rehabilitation Area – High Density Woody Vegetation (E)	E	Decommissioning	0	0	0	0	0	
			Landform Establishment	0	0	0	0	0	
			Growth Medium Development	0	23.7	13.3	22.6	26.7	7.6
			Ecosystem Establishment	201.9	201.9	225.6	238.9	261.5	288.2
			Ecosystem Development	0	0	0	0	0	0
			Relinquished Lands	0	0	0	0	0	0
			Total	201.9	225.6	238.9	261.5	288.2	295.7
Domain L – Rehabilitation Area – Dry Creek Reinstatement									
	Rehabilitation Area – Dry Creek Reinstatement (E)	L	Decommissioning	0	0	0	0	0	
			Landform Establishment	0	0	0	0	0	
			Growth Medium Development	0	0	0	0	0	
			Ecosystem Establishment	0	0	0	0	0	
			Ecosystem Development	0	0	0	0	0	

			Relinquished Lands	0	0	0	0	0	0
			Total	0	0	0	0	0	0
Domain M – Tree Restoration Areas									
	Tree Restoration Areas	M	Decommissioning	0	0	0	0	0	0
			Landform Establishment	0	0	0	0	0	0
			Growth Medium Development	0	0	0	0	0	0
			Ecosystem Establishment	0	0	0	0	0	0
			Ecosystem Development	0	0	0	0	0	0
			Relinquished Lands	0	0	0	0	0	0
			Total	0	0	0	0	0	0
Total –Secondary Domains				208	231	245	267	306	343
Total – Primary and Secondary Domains				986	1187	1220	1276	1373	1371

Notes:

- Decommissioning and Landform establishment are shown as 0 since these phases are usually complete during the year and progressed to Growth Medium Development by the end of the year.
- No rehabilitation is expected to be at the relinquishment phase during this MOP Term.
- All areas have been rounded up to the nearest Ha for table display purposes and therefore may show slight errors to the totals is adding the table numbers together.
- Domain Polygons and areas have changed since last MOP due to new domains being created for alignment to the new development consent – this will therefore not directly correspond to previous MOP or AEMR reporting.
- [Domain areas presented in the table are approximate only.](#)

7.4 Relinquishment phase achieved during MOP Period

No areas at Bengalla either before or during the MOP period will meet the requirements for completed rehabilitation – the Relinquished Lands Phase.

8 Rehabilitation Monitoring

Bengalla **undertakes** an annual monitoring program to address the performance indicators and completion criteria defined in Section 6.

The annual rehabilitation monitoring program is undertaken through the implementation of both transect-based monitoring and a rehabilitation audit:

- The transect-based monitoring was first implemented in 2009, and has been undertaken annually since 2011.
- The rehabilitation audit consists of a reconnaissance level walkthrough assessment, including opportunistic observations of rehabilitation performance. **The rehabilitation audit** report provides recommendations for remedial works.

Further detail on the methodologies and approaches adopted for the rehabilitation monitoring program are provided in the following sections.

8.1 Transect-based Monitoring

The transect-based monitoring relies on quantitative data that is collected in a consistent and repeatable manner to allow multi-year comparison of trends and assessment of changes occurring over time. The outcomes and results of the monitoring indicate whether the rehabilitated lands meet the relevant performance criteria or if they require management interventions to achieve the criteria.

8.1.1 Monitoring Transects

The transect-based approach is suitable for assessing rehabilitation performance against the completion criteria as the transects are readily established, the data collection is simple to execute and the resultant data is scientifically robust. Each monitoring transect consists of a standardised 50m long and 10m wide linear transect with nested 2m x 2m and 1m x 1m quadrats, as depicted in Figure 1. The 50 m x 10 m transect size is widely accepted internationally and supported by data from Neldner and Butler (2008) which indicates that around 90% of an area's biodiversity is sampled effectively in 500m² plots.

The 50m transect line is established along the contour with the start and end points of the transect permanently marked with a metal star picket and their geographical coordinates recorded using a GPS.

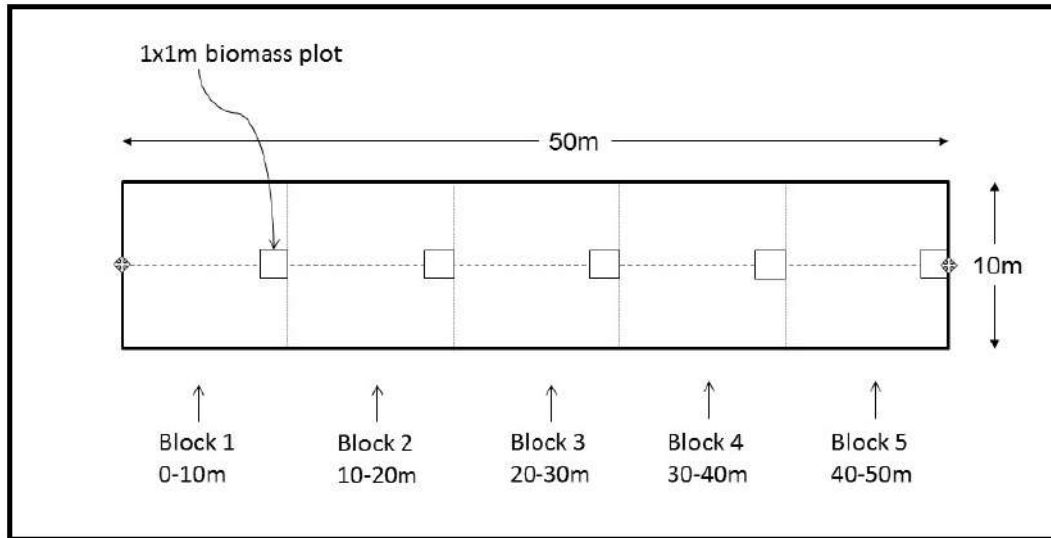


Figure 5: Monitoring transect layout

A total of 16 monitoring transects have been established at Bengalla. This includes 12 rehabilitation sites located across the Eastern OEA, two sites on a constructed and revegetated visual bund located south of the CHPP and two analogue sites located on nearby regenerating native vegetation (see Table 30).

It is noted that several monitoring transects historically monitored across the eastern OEA have been removed from the current monitoring program as they are located in areas planned to be reworked to HDWV. Two analogue sites monitored in previous year's no longer form part of the monitoring program due to mine progression, refer to section 9.1.2.

Table 30: Rehabilitation Monitoring Program Study Transects

Transect name	Geographical location #		Final land use classification	Slope	Rehab completed	Transect established	
	New	Easting					Northing
RHB NW1		297,162	6,427,200	High density native vegetation on Class IV or V land.	18%	2005	2009
RHB NW2		297,401	6,428,140	High density native vegetation on Class IV or V land.	23%	2004	2009
RHB NW3		296,900	6,427,455	High density native vegetation on Class IV or V land.	11%	2008	2012
RHB NW4 *		297,270	6,427,312	High density native vegetation on Class IV or V land.	15%	2003	2009
RHB NW5 *		297,201	6,428,197	High density native vegetation on Class IV or V land.	12%	2008	2014
RHB P3		296,703	6,427,672	Pasture on Class III land.	2%	2012	2014
RHB P1 *		296,972	6,427,988	Pasture on Class IV or V land.	1%	2010	2014
RHB P2 *		296,551	6,427,199	Pasture on Class IV or V land.	21%	2014	2015

RHB NW6 *	297,304	6,427,722	High density native vegetation on Class IV or V land.	21%	2011	2015
RHB NW7 *	296,871	6,426,887	High density native vegetation on Class IV or V land.	25%	2014	2015
RHB NW8 *	296,832	6,426,500	High density native vegetation on Class IV or V land.	20%	2014	2015
RHB NW9 *	296,429	6,426,197	High density native vegetation on Class IV or V land.	19%	2015	2015
ANA NW1 *	293,055	6,427,002	Regenerating native woodland, within cattle exclusion fence.	8%	N/A	2009
ANA NW2 *	293,042	6,427,117	Regenerating native woodland, outside exclusion fence but currently ungrazed.	7%	N/A	2012
ANA NW1	291,407	6,426,318	Native Box Gum Woodland	13%	N/A	2016
ANA NW2	291,536	6,426,578	Native Box Gum Woodland	16%	N/A	2016
VB NW1	294,426	6,425,184	High density native vegetation on Class IV or V land.	25%	N/A	2016
VB P1	293,824	6,424,936	Pasture on Class IV or V land.	30%	N/A	2016

* Monitoring transects removed from the current monitoring program.

Geographic Coordinate System: GDA_94_MGA_Zone_56

It is proposed that new monitoring sites will be established at a density of one transect per 10 ha of rehabilitation polygons to verify rehabilitation success. A rehabilitation polygon is a continuous block of rehabilitation complete in a specific year. The location of new transects will be randomised to minimise observer bias during transect placement.

Table 31: Rehabilitation Monitoring Program Methodology

Monitoring component	Assessment area	Methodology
All monitoring transects		
Slope	N/A	<ul style="list-style-type: none"> Slope gradient at the transect line is measured using a digital clinometer.
Erosion	10m x 50m transect area	<ul style="list-style-type: none"> Erosion is assessed in accordance with the guidelines in the <i>Australian Soil and Land Survey Field Handbook</i> (CSIRO, 2009) for sheet, rill, gully and tunnel erosion. Where rills and gullies are present, their location, width and depth are recorded along the 50m transect line.
Ground cover protection	2m x 2m quadrats	<ul style="list-style-type: none"> The percentage ground cover of live vegetation (projected), organic litter, rocks, logs/woody debris, cryptograms and bare ground are visually estimated.
Ground cover composition	2m x 2m quadrats	<ul style="list-style-type: none"> Ground cover species (grasses, herbs, forbs, etc.) are recorded and assigned a cover abundance score using a modified six-point Braun-Blanquet scale (<5%; 5-25%, 25-50%, 50-75%, 75-95%, >95%), adhering to the following: <ul style="list-style-type: none"> All desirable species are identified to the species level wherever possible;

		<ul style="list-style-type: none"> Listed noxious weed species (+ Galenia) are assessed and rated individually; and Broadleaf environmental weeds need not be individually identified and can be grouped and assigned a combined rating (although notes can be made on the dominant species present).
Soil monitoring	N/A	<ul style="list-style-type: none"> A hand shovel or auger is used to determine the thickness of the growing media layer¹. A soil sample is collected from the top 100mm using and sent to a NATA-accredited laboratory for testing of the following parameters: <ul style="list-style-type: none"> Soil pH and Electrical Conductivity; Cation exchange capacity and exchangeable major cations; Exchangeable Sodium Percentage; Major nutrients – Nitrogen, Phosphorous and Potassium; Organic Matter content; and Particle size analysis.
Photographic monitoring	50m transect line	<ul style="list-style-type: none"> Digital photographs are taken from start the 50m transect with the end of transect in centre background, and from the end of the transect looking in. Opportunistic photographs are taken of rehabilitation performance as required – including of active disturbance processes.
Pasture monitoring transects		
Pasture biomass	1m x 1m quadrats	<ul style="list-style-type: none"> All herbage is cut to ground level using hand shears and the clipped material weighed on site using a digital scale to determine the green herbage biomass.
Feed quality	10m x 50m transect area	<ul style="list-style-type: none"> A sample of available forage material is collected (in accordance with the guidelines provided by the NSW DPI for pasture sampling) and sent to a NATA-accredited laboratory for feed quality testing including: <ul style="list-style-type: none"> Dry matter content and digestibility, Organic matter content and digestibility, Crude protein and fibre content, and Metabolisable energy.
Woody Vegetation monitoring transects		
Woody species diversity and density	10m x 50m transect area	<ul style="list-style-type: none"> All individuals of woody species are identified and recorded. Each recorded individual is categorised within a height category as follows: <1m, 1-3m, 3-5m, 5-8m, 8-12m, >12m.
Habitat potential	10m x 50m transect area	<ul style="list-style-type: none"> The presence and abundance of ground logs/woody debris, large rocks or reclaimed habitat trees is quantified and recorded. Foliage canopy cover of low shrubs, mid shrubs and canopy trees is estimated along the 50m transect line. Other indicators of habitat complexity are noted (and photographed) as relevant – e.g. thick litter layer, tree hollows, mistletoes, production of buds, flowers and fruits, etc.
Ecosystem resilience ²	10m x 50m transect area	<ul style="list-style-type: none"> Results of the woody species height stratification are used to determine the occurrence of second generation seedlings. The reproductive status of established shrubs / trees is rated according to the following rating system: <ul style="list-style-type: none"> Nil (0) – no buds, flowers or fruits evident; Rare (1) – buds, flowers or fruits very hard to find, less than 1% of potential load; Few (2) – low numbers of buds, flowers or fruits, less than 10% of potential load;

		<ul style="list-style-type: none"> - Moderate (3) – scattered buds, flowers or fruits, 11% to 50% of potential load; - Common (4) – buds, flowers or fruits obvious, 50% to 90% of potential load; - Abundant (5) – heavily loaded with buds, flowers or fruits, >90% of potential load. <p>To avoid bias and ensure that measurements are meaningful and robust, up to five individuals of the same species are permanently tagged at Year 5 of monitoring, and measurements are repeated on the tagged individuals over time.</p>
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¹ This assessment is only undertaken for monitoring sites at Year 1 and Year 5 of establishment.

² This assessment is only undertaken for monitoring sites at Year 5 and Year 10 of establishment (and older).

8.2 Rehabilitation Audit

The rehabilitation audit is undertaken to complement the transect-based monitoring. In contrast to the transect-based methodology, the audit consists of a reconnaissance assessment of rehabilitated land at Bengalla. Together, the transect-based and audit monitoring provide a description of rehabilitation performance across the site on an annual basis.

8.2.1 Audit Methodology

The audit consists of a walkover assessment of the site's rehabilitation areas, covering an area as comprehensively as possible within a reasonable time allocation (i.e. walking the site in cross-sections). While covering rehabilitation areas on foot, opportunistic sightings and assessments are made identifying the following where relevant:

- Stability of slopes and landforms – including presence and severity of active erosion areas (e.g. rill, gully and tunnel erosion).
- Function and condition of existing erosion and sediment control structures and landform features, including water management structures (e.g. spine drains), water ponding areas, etc. (where applicable).
- Visual assessment of ground protection and vegetation cover, vegetation health and growth rates.
- Areas of significant weed incursion.
- Evidence of presence/impact of vertebrate pests.
- Any other disturbance factors or features, such as presence of mine waste, track disturbance, damaged fences etc.

8.2.2 Audit Frequency and Study Area

The rehabilitation audit will continue to be undertaken annually during the life of this MOP.

As mining progresses the total area of rehabilitated lands increases over time. As a result, the rehabilitation may be split into two areas of (approximately) equal size with the areas audited alternatively within sub-subsequent years (i.e. one half audited in one year, the second half audited in the following year).

8.3 Reporting

Rehabilitation monitoring reports are prepared annually to document the rehabilitation performance observed in the monitoring program. The reporting includes an assessment of rehabilitation performance against the MOP criteria listed in Section 6.

Pictorial and GIS-based data collected during the rehabilitation monitoring program (e.g. photo monitoring data, geographical locations of identified issues and of monitoring points, etc.) are also centralised and maintained. Over time, the pictorial / GIS data can be used to document the evolution of rehabilitation condition, particularly following the implementation of remedial works.

9 Research Programs and Analogue Sites

9.1.1 Biochar – Soil Carbon Project

The Agricultural Productivity Research Programme proposal was submitted in July of 2011 during the draft consent consultation period. The submission made by BMC was accepted and the proposal was included into the development consent **modification** that was approved in October 2011.

The research program commenced in late 2011 and ran over four years, with the aim of improving land-use and land-use outcomes in the Upper Hunter Valley. The program was undertaken in partnership with the University of Newcastle, BDM Resources, Hunter Local Land Services and 17 regional landowners.

The objective of the program was to develop a predictive tool to determine the potential of building soil carbon. Biochar, derived from green waste, was used to build soil carbon in an attempt to improve soil characteristics. In particular, the program aimed to increase soil productivity as part of a comprehensive approach to the rehabilitation of mine sites in the Hunter Valley, NSW.

Initial experimental pot trials of Biochar soil commenced during 2013. Preliminary pot trials identified a significantly positive plant response to Biochar and a number of potential causative mechanisms behind the improved plant growth. The impact of Biochar on plant growth was measured by plant germination rate, yield and growth rate (height).

All sites were re-sampled in April 2015. While there were fluctuations at property and paddock scale, the overall results for the project were positive. By grouping all sites, an increase in soil carbon levels was achieved. The program has been completed and the final report delivered

9.1.2 Analogue Sites

Bengalla had two native vegetation analogue sites situated west of the operation in pre-mined land. Site 1 was situated in regenerating forest within a cattle exclusion zone (established 2009), while site 2 was situated in regenerating forest within a grazed paddock (established 2012).

These two analogue sites have been removed from the rehabilitation monitoring program as they were located in areas that have been and/or will be impacted by the continuation of mining. Two replacement sites have been established in native woodland vegetation to the west of the mining lease.

The new analogue sites were selected to be within Box Gum Woodland vegetation communities. The sites were established in areas where visual inspections indicated that high stem densities occurred. This was done with the view to document what shrub/tree densities can naturally be achieved on local soils/landforms/conditions in Box Gum Woodland communities – thereby defining a realistic benchmark for the **HDVV** criteria.

There are no plans to establish analogue sites for Pasture Domains. Parameters for completion criteria **may** be based on and refined from grazing trials and comparable productivity (**to other locations**) to the associated land capability.

9.1.3 Grazing Trials on Rehabilitated Lands

To demonstrate the capability of rehabilitated land to achieve final land use objectives, BMC commenced a cattle grazing trial within established rehabilitation on the Eastern OEA in June 2015. The trial area was stocked with local breeding stock at a rate of approximately three cattle per hectare.

The trial ran for three months, with the cattle removed in August 2015. At the conclusion of the trial period, all the calves from the trial site were in a marketable weight and condition and were sold in October 2015.

The 2015 rehabilitation monitoring results indicated that the grazing trial may have contributed to improved growth in pasture species and to the removal of litter. Weed coverage also appeared reduced after completion of the trial. No active erosion was identified within the vicinity of the monitoring site located in the trial area following the trial.

Whilst the results of the initial trial are encouraging, they are not conclusive and additional trials will need to be conducted in to assess the response of pasture rehabilitation to cattle grazing.

9.1.4 Revegetation Trials

To comply with the requirements of SSD-5170 as modified Schedule 3 Condition 44, and at the request of the Division of Resources and Geoscience (now DPIE-RR), BMC has prepared the Eastern Face Rehabilitation Strategy – Revegetation Trails (the Woody Vegetation Strategy). The Woody Vegetation Strategy seeks to improve BMC's understanding and application of two rehabilitation methods commonly used in coal mine rehabilitation programs in the Hunter Valley.

The Woody Vegetation Strategy outlines two methods of soil cultivation and sowing to be trialled on two separate areas of rehabilitation on the eastern OEA. Method 1 consists of deep ripping of the topsoil and subsoil layers using a D5 dozer. Seed broadcasting and incorporation for Method 1 are via equipment mounted on a tractor linkage. Method 2 consists of shallower soil cultivation and direct seeding in a created seed bed, with the deposited seeds being pressed into the seed bed by a stippled roller. Method 2 allows for soil cultivation, seed bed preparation, seed application and incorporation to be undertaken concurrently in a single pass through equipment mounted on a tractor linkage.

The trial works commenced 26 September 2016 and were completed on 11 October 2016. The trials will be monitored monthly over a 12-month period. The principal objective of the monthly monitoring program is to quantify the success of each of the methods being trialled, particularly in terms of woody vegetation germination and establishment.

BMC are currently undertaking a tube stock trial on the eastern face of the OEA during 2019 with appropriate monitoring will follow.

9.1.5 Species Suitability Trials

Species suitability in both Pasture and HDWV Domains will continue to be assessed as part of the annual rehabilitation monitoring program. The findings will be used to develop and refine seed mixes and completion criteria as an ongoing process.

9.1.6 Weed Control Trials on Rehabilitated Lands

Weed control on rehabilitated lands will be ongoing and varied based on the weed species and coverage area. Both herbicides and cover crops are used on areas of the rehabilitation to address weeds. The success of weed management activities will be monitored during regular inspections and during the annual rehabilitation monitoring program. The findings will inform improvement of weed control on site.

9.1.7 Tailings to Topsoil

Research into the effectiveness of blending tailings and soils have commenced with germination and ex-situ glasshouse plant growth trials conducted at the University of Newcastle. To assess in-situ conditions, a plant growth trial is planned to be conducted at the Bengalla mine site. This will assess plant growth studies of 3 species of plants, at two tailings to soil mixing ratios and a soil only (control) experiment.

10 Intervention and Adaptive Management

10.1 Threats to Rehabilitation

Progressive rehabilitation will occur as soon as practicable after mining is complete. An analysis of risks to achieving rehabilitation at Bengalla has been undertaken in Table 32. These risks form the basis of the TARP.

10.2 Trigger Action Response Plan

The TARP has been developed to manage risks outlined in Table 33. The TARP identifies proposed actions in the event of unexpected variations or impacts to rehabilitation, e.g. a failure to meet a nominated completion criterion (Table 33).

Table 18 to Table 23 have been developed for each phase of rehabilitation and include the following information for each domain:

- Rehabilitation phase:
 - Phase 1 – Decommissioning.
 - Phase 2 – Landform Establishment.
 - Phase 3 – Growth Medium Development.
 - Phase 4 – Ecosystem and Land Use Establishment.
 - Phase 5 – Ecosystem and Land Use Sustainability.
 - Phase 6 – Land Relinquishment.
- Domain name.
- Rehabilitation objective(s).
- Performance indicator(s).
- Completion criteria.
- Monitoring methodology.
- Monitoring frequency.
- Justification or source for criteria.
- Completion status.
- Link to TARP.
- Progress at start of the MOP (i.e. rehabilitation as at the start of the calendar year).

Bengalla's rehabilitation monitoring program will be the primary means to monitor the effectiveness of the mitigation measures for each planned response action. Trigger levels provide for early responses to emerging risks to rehabilitation. As conditions at Bengalla change, new hazards may be identified and added to the TARP. Bengalla will review its risks and update the TARP as required.

Table 32: Analysis of Rehabilitation Threats

Phase	Rehabilitation Threat	Potential Adverse Outcome	Consequence	Likelihood	Risk Rating
1	Failure to decommission effectively	Unable to progress rehabilitation	1	D	L
2	Landform not compliant with the approved landform	Landform does not integrate with surrounding landscape; Unable to meet land capability requirements.	2	C	M
2	Unsuitable surface material	Exposure of reject, carbonaceous or acid rock drainage material; Spontaneous combustion; Unable to meet completion criteria.	2	C	M
2	Unstable final void or landform	Unable to meet land capability requirements; Potential public safety issues	3	D	M
2	Inability to reshape final landform	Unable to progress rehabilitation	1	D	L
3	Inadequate growth medium quality	Poor establishment of vegetation; Unable to meet post mining land use requirements.	2	C	M
3	Insufficient growth medium quantity	Poor establishment of vegetation; Unable to meet post mining land use requirements.	2	C	M
4	Uncontrolled access	Damage to rehabilitation	2	C	M
4	Inadequate seed for rehabilitation	Poor establishment of vegetation	2	C	M
4	Poor establishment of vegetation	Unable to meet completion criteria	2	C	M
4	Inadequate species diversity	Unable to meet completion criteria	2	C	M
4	Inadequate weed control	Unable to meet completion criteria	3	C	H
4	Inadequate feral animal control	Unable to meet completion criteria	2	C	M
4	Insect attack, disease infestation	Poor establishment of vegetation	2	C	M
4	Lack of habitat features	Native fauna not present in ecosystem	2	C	M

Phase	Rehabilitation Threat	Potential Adverse Outcome	Consequence	Likelihood	Risk Rating
4	Pasture areas not suitable for grazing productively	Unable to meet land capability requirements	3	D	M
4	Lack of follow up maintenance	Degradation of rehabilitation quality	3	C	H
4/5	Decline in soil quality	Degradation of rehabilitation quality	3	D	M
4/5	Surface water quality inadequate	Unable to meet completion criteria	2	C	M
4/5	Unexpected settlement or surface condition	Unable to meet completion criteria	3	D	M
5	Severe and/or prolonged drought	Failure of vegetation	2	C	M
5	Lack of bushfire resilience	Damage to rehabilitation	3	D	M
5	Unsatisfactory quality of final void waters	Unable to meet completion criteria	3	D	M
All	Active erosion on rehabilitated areas	Degradation of rehabilitation quality	2	C	M
All	Rehabilitated areas not meeting land capability criteria	Unable to complete rehabilitation	3	D	M
All	Major Storm event	Widespread damage to rehabilitation areas	3	D	M
All	Changing climatic conditions	Environmental management failure or inability to meet completion criteria	2	C	M
All	Major geotechnical failure of OEA	Widespread damage to rehabilitation areas	3	D	M
All	Continuous offsite release of contaminants	Long-term management of treatment	3	D	M
All	Spontaneous Combustion or Acid Rock Drainage	Environmental impacts or property damage	3	D	M
All	New regulatory requirements or community expectations	leading to difficulties negotiating or attaining completion criteria.	2	C	M
All	Progress from rehabilitation phase 1 through to phase 6 impeded	Unable to meet completion criteria	3	D	M

Table 33: Trigger Action Response Plan

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
Failure to decommission effectively	<ul style="list-style-type: none"> Not included in closure planning 	<ul style="list-style-type: none"> Closure planning to include decommissioning 	<ul style="list-style-type: none"> Visual inspection at time to decommission 	<ul style="list-style-type: none"> Create decommissioning plan if not included in closure planning and remove remaining infrastructure/equipment. 	1
Final Landform not compliant	<ul style="list-style-type: none"> Insufficient material Not shaped to design 	<ul style="list-style-type: none"> Mine planning schedules and designs updated annually Shaping to final landform to design Survey control and monitoring GPS equipment utilisation 	<ul style="list-style-type: none"> Mine planning monitoring to design compliance 	<ul style="list-style-type: none"> Review dump designs and schedules Discussions with DPIE-RR on variance Changes to MOP and final landform Remedial work to achieve design 	2
Unsuitable surface material	<ul style="list-style-type: none"> Rocky, carbonaceous or ARD material incorrectly dumped Inappropriate handling of materials 	<ul style="list-style-type: none"> Mine planning mining and dump sequences ARD and mineral waste management plan Dump designs Chemical approval process to use products onsite. Maintain the contaminated land register. 	<ul style="list-style-type: none"> Visual inspections prior to and during landform establishment 	<ul style="list-style-type: none"> Removal of unsuitable material and replacement with suitable material Remediation as required 	3
Unstable final void or landform	<ul style="list-style-type: none"> Weak material Slopes too steep Slopes not stabilised 	<ul style="list-style-type: none"> Suitable material used Dump construction geotechnically assessed Final landform to be rehabilitated as soon as practicable 	<ul style="list-style-type: none"> Visual inspections Design assessments 	<ul style="list-style-type: none"> Investigate source of instability and develop remediation plan (i.e. backfill, stabilise, redirect water flow) 	4
Inadequate growth medium quality	<ul style="list-style-type: none"> Poor topsoil management 	<ul style="list-style-type: none"> Active topsoil management 	<ul style="list-style-type: none"> Soil testing prior to use 	<ul style="list-style-type: none"> Utilisation of appropriate soil ameliorants 	5

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
	<ul style="list-style-type: none"> Inadequate topsoil resource 			<ul style="list-style-type: none"> Review of topsoil during rehabilitation monitoring. 	
Insufficient growth medium quantity	<ul style="list-style-type: none"> Poor topsoil inventory management Inadequate topsoil resource Erosion 	<ul style="list-style-type: none"> Topsoil inventory management Stabilisation 	<ul style="list-style-type: none"> Topsoil inventory balancing Mine planning Rehabilitation monitoring program 	<ul style="list-style-type: none"> Identify other sources of growth medium. Re-apply topsoil/growth medium 	6
Uncontrolled access	<ul style="list-style-type: none"> Demarcation not installed Existing demarcation damages 	<ul style="list-style-type: none"> Demarcation installed Visual inspections 	<ul style="list-style-type: none"> Visual inspections 	<ul style="list-style-type: none"> Install/alter demarcation where required 	7
Inadequate seed for rehabilitation	<ul style="list-style-type: none"> Pre-mining areas may be a poor seed resource Natural factors Poor seed management External supplier issues 	<ul style="list-style-type: none"> Species mix aligned to the plant community of the site. Seed areas to match expected seasonal variation/conditions, e.g. cover crops in Summer. Establish a broad supply base of seed to mitigate supply limitations Establish a broad species base to mitigate undersupply and climatic variation. 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review Vegetation community and species list Initiate revegetation program 	8
Poor establishment of vegetation	<ul style="list-style-type: none"> Natural factors Sowing time Inadequate growth medium 	<ul style="list-style-type: none"> Seasonal sowing program or cover cropping Use of ameliorants in growth medium Broad species base 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Create revegetation plan (re-sowing or tube stock), seasonal considerations and finding from investigation. 	9
Inadequate species diversity	<ul style="list-style-type: none"> Natural factors Inadequate seed quality 	<ul style="list-style-type: none"> Broad species base Seasonal sowing program or cover cropping Evidence for species suitability 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review species list and seasonal sowing program 	10

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
Inadequate weed control	<ul style="list-style-type: none"> Natural Factors Inadequate topsoil management Lack of rehabilitation maintenance 	<ul style="list-style-type: none"> Encourage rapid establishment of ground cover (direct application onto or within organic mediums is preferred option). Weed control undertaken in accordance with the requirements of the Noxious Weeds Act 1993. Weed species density and distribution monitored. Weed control undertaken by competent operators. Topsoil supply assessed for weeds prior to stripping and treated, if required. 	<ul style="list-style-type: none"> Rehabilitation monitoring program Surrounding Landholders 	<ul style="list-style-type: none"> Initiate Weed management program Regenerate vegetation in affected areas 	11
Inadequate feral animal control	<ul style="list-style-type: none"> Natural Factors Lack of rehabilitation maintenance 	<ul style="list-style-type: none"> Presence of damage from pest animal species monitored. Pest animal control undertaken by competent operators 	<ul style="list-style-type: none"> Rehabilitation monitoring program Surrounding Landholders 	<ul style="list-style-type: none"> Initiate Pest management program Regenerate vegetation in affected areas 	12
Insect attack, disease infestation	<ul style="list-style-type: none"> Natural Factors Lack of rehabilitation maintenance 	<ul style="list-style-type: none"> Aim to encourage diversity within the vegetation community and undertake regular monitoring. Encourage spiders, insects, frogs, lizards and insectivorous birds possibly by providing suitable habitat and food resources such as nesting boxes, logs, rocks, wetland areas etc. 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Initiate revegetation program to compensate for areas of deficiency 	13
Lack of habitat features	<ul style="list-style-type: none"> Logs, fallen trees and rocks not present in native areas 	<ul style="list-style-type: none"> Ensure that habitat features are included in woody vegetation rehabilitation 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Create/install more habitat features in woody vegetation rehabilitation 	14
Pasture areas not suitable for grazing productively	<ul style="list-style-type: none"> Rehabilitation does not meet land capability Low soil fertility impedes the 	<ul style="list-style-type: none"> Plan grazing trials to ensure suitability by the time of relinquishment Use of industry knowledge in surrounding area and other mine sites 	<ul style="list-style-type: none"> Results of trials Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review Pasture domain based on results of trials Develop and implement an adequate fertiliser regime based on soil testing results 	15

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
	development of a productive pasture			and identified nutrient deficiencies.	
Lack of follow up maintenance	<ul style="list-style-type: none"> Budget constraints 	<ul style="list-style-type: none"> Undertake regular monitoring and implement action strategy when required Include suitable maintenance costs in budget 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review budget annually 	16
Decline in soil quality	<ul style="list-style-type: none"> Poor quality Growth medium Lack of follow up maintenance 	<ul style="list-style-type: none"> Topsoil Management Rehabilitation Monitoring and maintenance 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Initiate additional rehabilitation maintenance to improve soil quality 	17
Surface water quality inadequate	<ul style="list-style-type: none"> Water contamination 	<ul style="list-style-type: none"> Encapsulation of carbonaceous and ARD material No hazardous material on the landform surface Stabilise surface as soon as possible 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Remediate contamination or stabilise surface depending on the source. 	18
Lack of bushfire resilience	<ul style="list-style-type: none"> Natural factors, Inappropriate management of fire related risk activities Inappropriate maintenance of fire controls 	<ul style="list-style-type: none"> Selection of fire-tolerant species for revegetation and adoption of standard fire prevention measures. Fire management on buffer land, including obligation of lease agreements for landholders to maintain firebreaks and minimise fire hazards. 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Monitor regrowth and initiate revegetation program if affected rehabilitation areas do not regenerate. (historical lightning strike on south dump regenerated without intervention) 	19
Unexpected settlement or surface condition	<ul style="list-style-type: none"> Inappropriate dump design or execution. 	<ul style="list-style-type: none"> Dump design includes reject emplacement considerations, and settlement monitoring Rock raking of rehabilitation areas. 	<ul style="list-style-type: none"> Survey, Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review operating procedures and initiate corrective actions. 	20
Severe and/or prolonged drought	<ul style="list-style-type: none"> Natural factors 	<ul style="list-style-type: none"> Selection of drought-tolerant species for revegetation. Selection of species aligned to desired vegetation community. 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review existing species list and change if required. Remedial rehabilitation (re-seeding), if required. 	21

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
Unsatisfactory quality of final void waters	<ul style="list-style-type: none"> Poor design parameters 	<ul style="list-style-type: none"> Upon closure, model final limnology of pit waters to assess risks associated with stratification. If required, configure final voids to minimise risk of stratification and overturning. 	<ul style="list-style-type: none"> Water monitoring program 	<ul style="list-style-type: none"> Investigation to identify source, then develop possible remedial actions 	22
Active erosion on rehabilitated areas	<ul style="list-style-type: none"> Poor rehabilitation design Storm events 	<ul style="list-style-type: none"> Rehabilitation design, which minimises slope >10°. Rapidly stabilise the substrate and increase organic matter using sterile cover crops. Sow with appropriate methods perennial ground cover species suitable to the final land use. 	<ul style="list-style-type: none"> Rehabilitation monitoring program Design Compliance 	<ul style="list-style-type: none"> Complete earthworks to remediate affected areas Correct drainage lines Repeat mitigation measures 	23
Rehabilitated areas not meeting land capability criteria	<ul style="list-style-type: none"> Poor rehabilitation design and/or implementation 	<ul style="list-style-type: none"> Review of topsoil indicator parameters during rehabilitation monitoring program. Rehabilitation design as per specialist technical report. Landform Design aligns with Class 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Investigate and initiate corrective actions 	24
Failure to meet completion criteria	<ul style="list-style-type: none"> Incorrect Completion criteria, Incorrect implementation of rehabilitation 	<ul style="list-style-type: none"> Correct source/justification for criteria Annual monitoring of trending data 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Revise completion Criteria in conjunction with DRE 	25
Major Storm event	<ul style="list-style-type: none"> Design not compliant to MOP requirements Natural factors (storm intensity greater than design) 	<ul style="list-style-type: none"> Design final landforms to cope with major storm events (1 in 20 year ARI). 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review damage and plan corrective actions including earthworks, drainage and vegetation. 	26

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
Changing climatic conditions	<ul style="list-style-type: none"> Natural/External factors 	<ul style="list-style-type: none"> Assess climate change risks and implement adaptation measures where required. Adaptive rehabilitation outcomes/criteria based on long term climatic conditions, as required. Use of compost materials and mulches to increase organic carbon levels and improve soil structure with resultant increase in infiltration and water holding capacity. 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Develop action plan to revegetate based of future environmental factors and address causes. 	27
Major geotechnical failure of OEA	<ul style="list-style-type: none"> Inadequate dump design 	<ul style="list-style-type: none"> Routine geotechnical assessments. Slope and dump stability planning. 	<ul style="list-style-type: none"> Survey, Rehabilitation monitoring program 	<ul style="list-style-type: none"> Review modes of failure and initiate plan to correct earthworks and vegetation 	28
Continuous offsite release of contaminants	<ul style="list-style-type: none"> Failure of containment structures Inappropriate design 	<ul style="list-style-type: none"> Ongoing geochemical characterisation of mined materials and void wall rock during operations to accurately predict risk factors and develop management measures where required. Ongoing monitoring of runoff and seepage waters during operations to validate predictions. 	<ul style="list-style-type: none"> Rehabilitation monitoring program Water monitoring program 	<ul style="list-style-type: none"> Corrective earthworks to prevent offsite release and remediate the source of contamination. 	29
Spontaneous Combustion or Acid Rock Drainage	<ul style="list-style-type: none"> Natural material properties Inappropriate handling of materials 	<ul style="list-style-type: none"> Characterisation of spontaneous combustion risk and adoption of standard combustion prevention measures. ARD and Mineral Waste Management Plan 	<ul style="list-style-type: none"> Rehabilitation monitoring program 	<ul style="list-style-type: none"> Dig out affected areas where possible and seal, remedial earthworks with inert material and revegetate. 	30
New regulatory requirements or community expectations	<ul style="list-style-type: none"> External factors 	<ul style="list-style-type: none"> Monitor trends and developments in legislation and changes to community expectations. Continue to regularly consult with stakeholders to gain acceptance of completion criteria. 	<ul style="list-style-type: none"> New Guidelines and stakeholder engagement processes 	<ul style="list-style-type: none"> Continue to regularly consult with stakeholders to gain acceptance of completion criteria. 	31

Rehabilitation Threat	Contributing Factors	Mitigation Measures	Monitoring Process and Trigger	Proposed Response Action	TARP Ref No.
Progress from rehabilitation phase 1 through to phase 6 impeded.	<ul style="list-style-type: none">• See TARP references 1 -31.	<ul style="list-style-type: none">• Undertake rehabilitation monitoring to identify contributing factors.	<ul style="list-style-type: none">• Rehabilitation monitoring program	<ul style="list-style-type: none">• Undertake action recommended in the rehabilitation monitoring report.	32

11 Reporting

The following reporting for Bengalla will be undertaken:

- Annual Review (AR) (previously referred to as Annual Environmental Management Report).
- Incident reporting.
- Independent Environmental Audit.
- Compliance reporting.

Bengalla provides environmental information to the public via the Bengalla website including: statutory approvals and associated documents; summary of environmental monitoring results; complaints register; CCC meeting minutes; audit information, management plans and any other information required by the Secretary.

11.1 Annual Review

By the end of March each year, BMC will provide an Annual Review to the Secretary of [DPIE](#), which will review the environmental performance of Bengalla for the previous calendar year.

The Annual Review will be made publicly available through placement on BMC's website, and will be provided to the Bengalla CCC.

The Annual Review details activities undertaken during the reporting period that support progression towards the post mining land use goal and rehabilitation objectives. The AR includes:

- A summary of mining operations.
- A summary of rehabilitation activities.
- Environmental performance of:
 - Surface water.
 - Ground water.
 - Erosion and sediment control.
 - Waste management.
 - Contaminated land.
 - Flora and Fauna.
 - Weeds and Pests.
- Trends in monitoring data.
- Non-compliances.
- Actions based on non-conformances, incidents or monitoring results.
- Proposed activities Including:
 - Maintenance on Rehabilitation.
 - Research and Trials.
- Any other environmental areas required by the [DPIE-RR](#).

11.2 Auditing

Within one year of the commencement of development under SSD-5170 as modified (i.e. 1 October 2016) and every three years thereafter, unless the Secretary directs otherwise, BMC will commission and pay the full cost of an Independent Environmental Audit of Bengalla.

11.3 Rehabilitation Plan Review

Schedule 5, Condition 5 of SSD-5170 (as modified) requires that within three months of the submission of the following documents, BMC shall review, and if necessary, revise the RMP (or in Bengalla's case the MOP) to the satisfaction of [DPIE-RR](#):

- Annual review in accordance with Schedule 5, Condition 4.
- Incident report under Schedule 5, Condition 7.
- Audit report under Schedule 5, Condition 9.
- Modification to the conditions of SSD-5170 (unless the conditions require otherwise).

11.4 Reporting an Incident

Schedule 5, Conditions 3 and 7 of SSD-5170 as modified requires BMC to report any incident that has caused, or has the potential to cause, significant risk of material harm to either human health or the environment, at the earliest opportunity.

BMC shall immediately notify the Secretary of [DPIE](#) and relevant regulatory agencies of any incident (e.g. the EPA in accordance with EPL 6538). Within seven days of the date of incident, BMC will provide the Secretary (and the EPA in accordance with EPL 6538) and relevant agencies with a detailed report on the incident, and such further reports as may be requested.

11.5 Complaints

BMC has a procedure which details how to receive, respond to, record and address community complaints. BMC will maintain a record of community complaints and subsequent actions. The following details will be recorded:

- Complainant details (where provided).
- The nature of the complaint.
- How the complaint was made.
- Actions (if appropriate).
- Consultation undertaken.

Complaints regarding any environmental matters should be directed to the 24 hour environmental hotline: 1800 178 984. A complaints summary will be published monthly on BMC's website in accordance with Schedule 5, Condition 11(a).

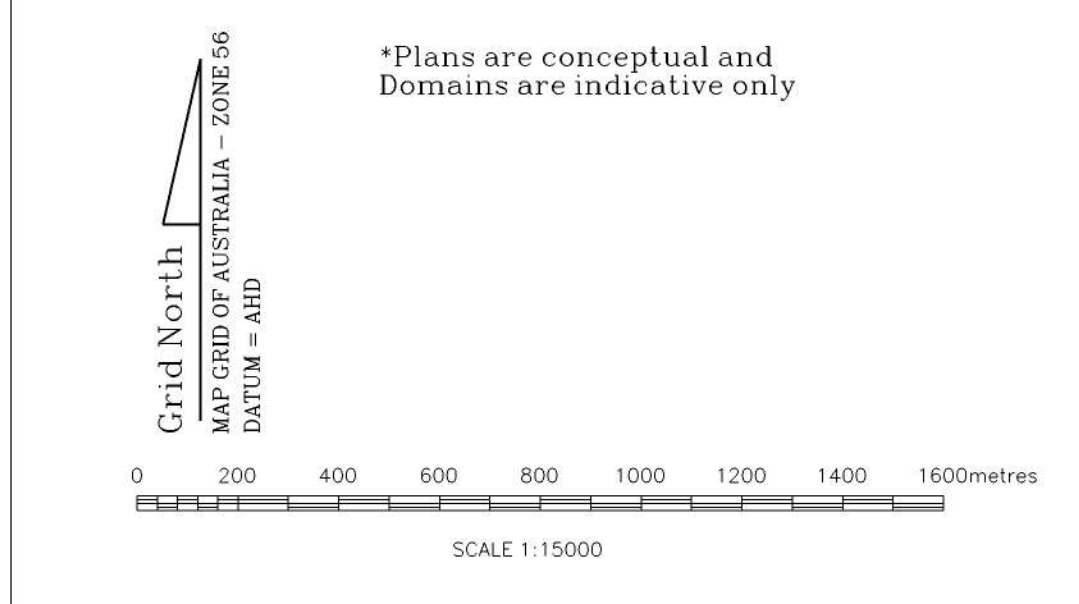
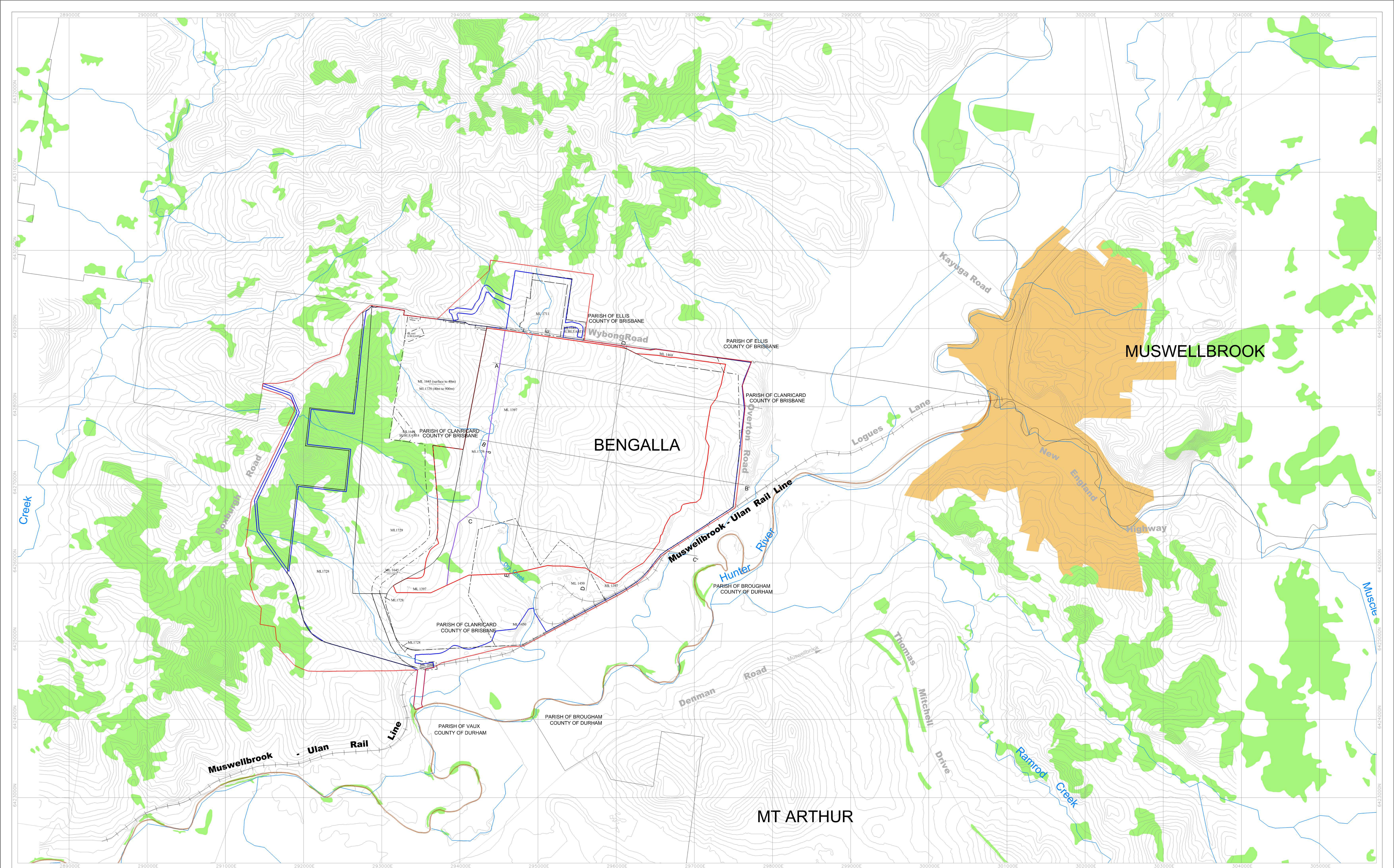
11.6 Continuous Improvement

New technologies will be investigated and adopted where reasonable and feasible.

Progress of rehabilitation management on site will continue to be monitored.

12 Rehabilitation Maps

Plan 1A - Pre Mining Environment – Project Locality



- Bengalla Mine Project Boundary
- Disturbance Boundary
- Proposed Extraction Boundary
- Previous Extraction Boundary
- - - Bengalla Mine Lease Boundary
- - - Proposed Bengalla Mine Lease Boundary
- - - Colliery Holding Boundary
- - - Proposed Colliery Holding Boundary
- Surface Contour
- Railway Line
- Woodland
- Urban Area
- Water Courses
- Roads

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne 12th Dec 2018
Registered Mine Surveyor Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell 12th Dec 2018
BMC Manager Mine Engineering Date



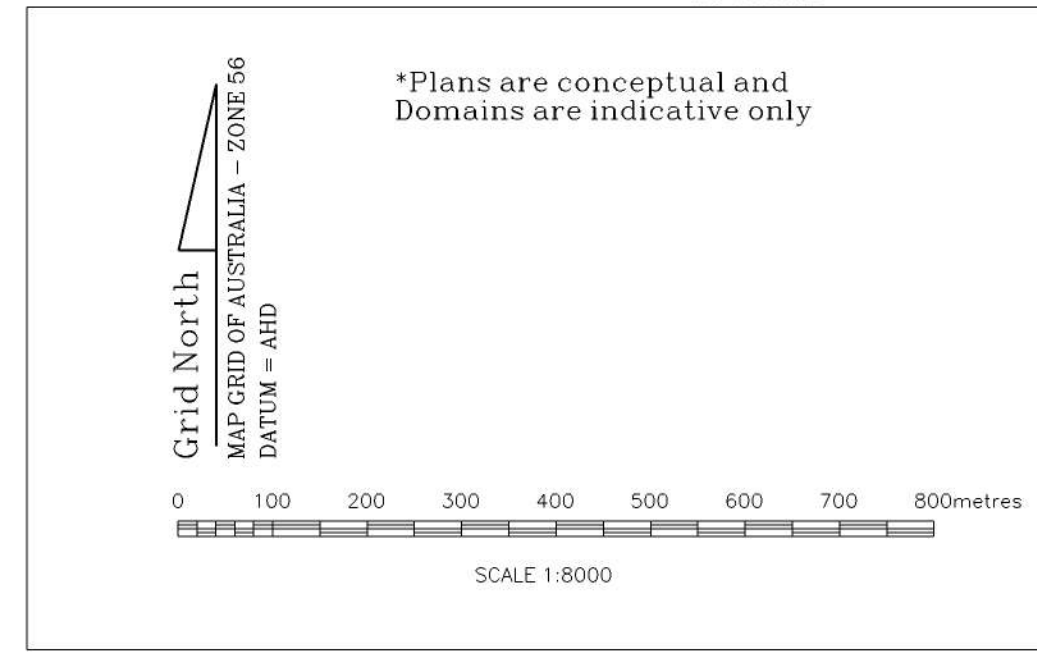
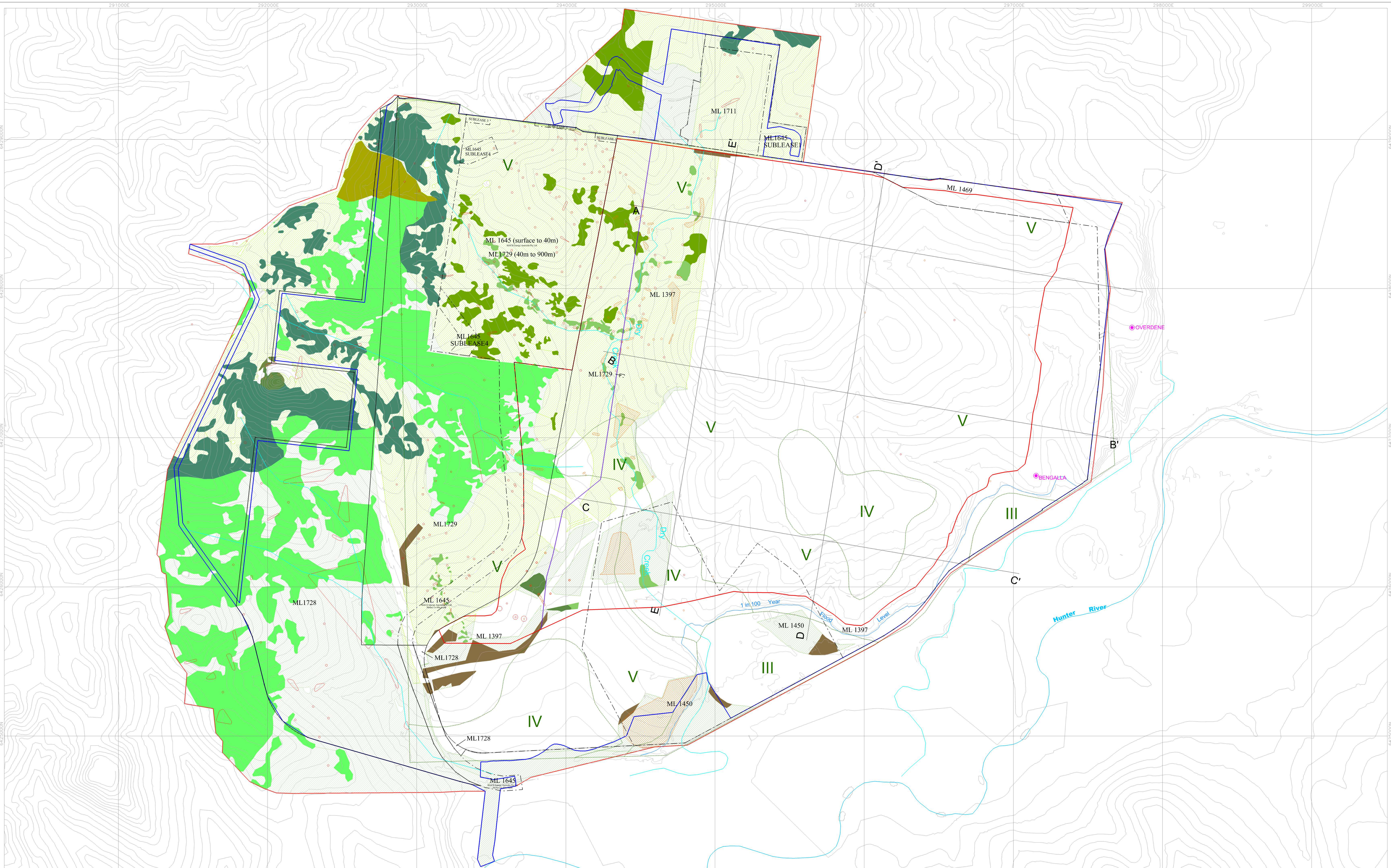
Bengalla Mining Company
Bengalla Road
LMB 5
Muswellbrook, NSW, 2333

Bengalla Mine

Mining Operations Plan (2017-2021) Amendment A
PLAN 1A – Pre-Mining Environment – Project Locality
 Application Date: February 2019

Date: 12th Dec 2018	Scale: 1:15000	Drawn: S.L.	Checked: I.P.	Approved: S.L.	Plan Size: A0
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Plan 1B - Pre Mining Environment – Natural Environment



- Bengalla Mine Project Boundary
- Disturbance Boundary
- Proposed Extraction Boundary
- Previous Extraction Boundary
- - - Bengalla Mine Lease Boundary
- - - Proposed Bengalla Mine Lease Boundary
- Colliery Holding Boundary
- Proposed Colliery Holding Boundary
- 1 in 100 year Flood Level
- Land Capability Boundaries
- Surface Contour
- Water Courses
- Heritage Site
- Isolated Artefact
- Artefact Scatter
- Grey Box/White Box Intergrade Grassy Woodland (CEC/EEC)
- Narrabeen Footlopes Slaty Box Woodland (EEC)
- Hunter Floodplain Red Gum Woodland (EEC)
- Upper Hunter Hills Exposed Ironbark Woodland
- Derived Native Grassland (CEC/EEC)
- Upper Hunter Hills Exposed Ironbark
- Low Diversity Derived Native Grassland/ Exotic Pasture
- Tree and Shrub Plantation
- Upper Hunter White Box – Ironbark Grassy Woodland (CEC/EEC)
- Central Hunter Ironbark – Spotted Gum Forest (EEC)

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment – division of Resources and Energy.

Ian Payne
 Registered Mine Surveyor 12th Dec 2018
 Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell
 BMC Manager Mine Engineering 12th Dec 2018
 Date

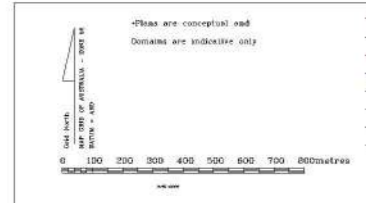
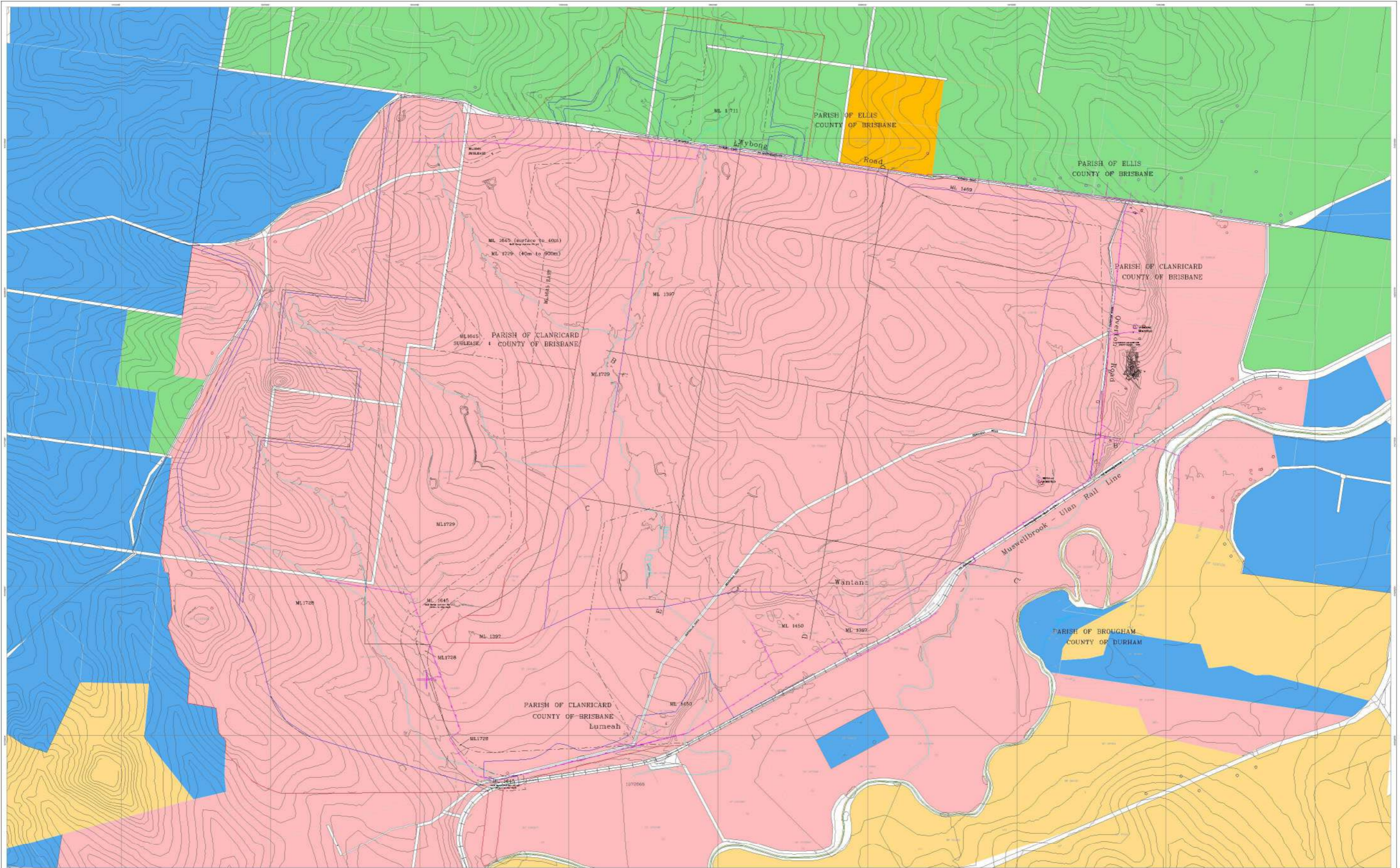
Bengalla Mining Company
 Bengalla Road
 LMB's
 Muswellbrook, NSW, 2333

Bengalla Mine

Mining Operations Plan (2017–2021) Amendment A
 PLAN 1B – Pre-Mining Environment – Natural Environment
 Application Date: February 2019

Date:	Scale:	Drawn:	Checked:	Approved:	Plan Size:
12th Dec 2018	1:8000	S.L.	I.P.	S.L.	A0

Plan 1C - Pre Mining Environment – Built Environment



- Bengalla Mine Project Boundary
- Disturbance Boundary
- Proposed Extraction Boundary
- Previous Extraction Boundary
- Bengalla Mine Lease Boundary
- Proposed Bengalla Mine Lease Boundary
- Outcrop Holding Boundary
- Proposed Outcrop Holding Boundary
- Powerlines
- Railway Line
- Feature
- Surface Contour
- Water Course
- Buildings
- Suspended/Abandoned Underground Services
- Roads

- Heritage Site
- Residence - Bengalla Mining Company
- Residence - Mt Pleasant
- Residence - Mt Arthur Coal
- Residence - Non-Mine Owned Residence
- Property - Bengalla Mining Company
- Property - Mt Pleasant
- Property - Mt Arthur Coal
- Property - Freehold
- Property - Crown

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resource and Energy.

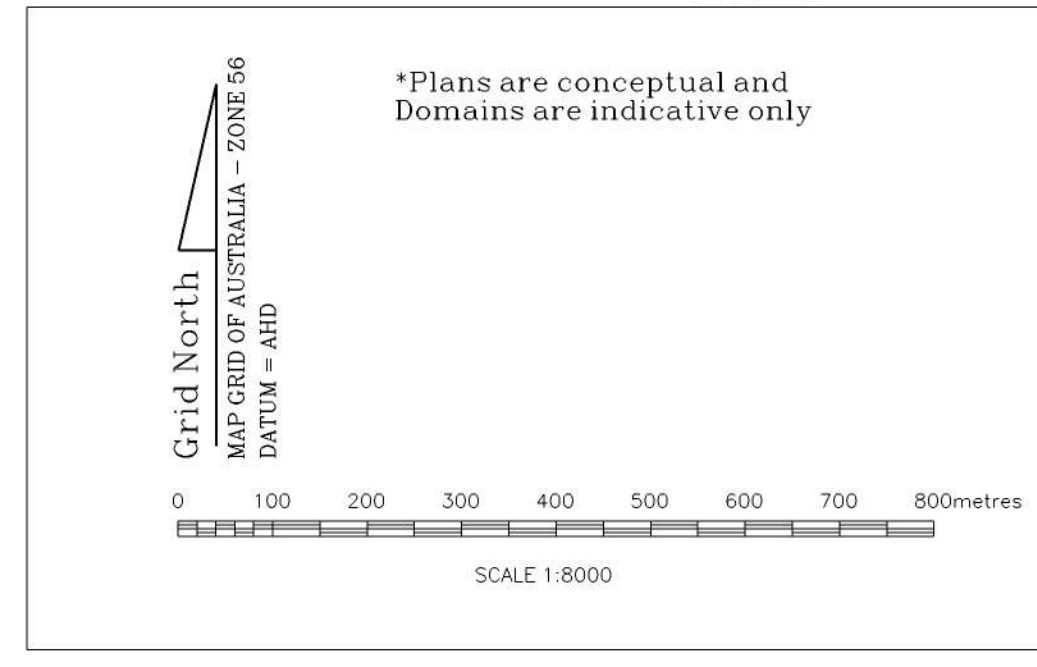
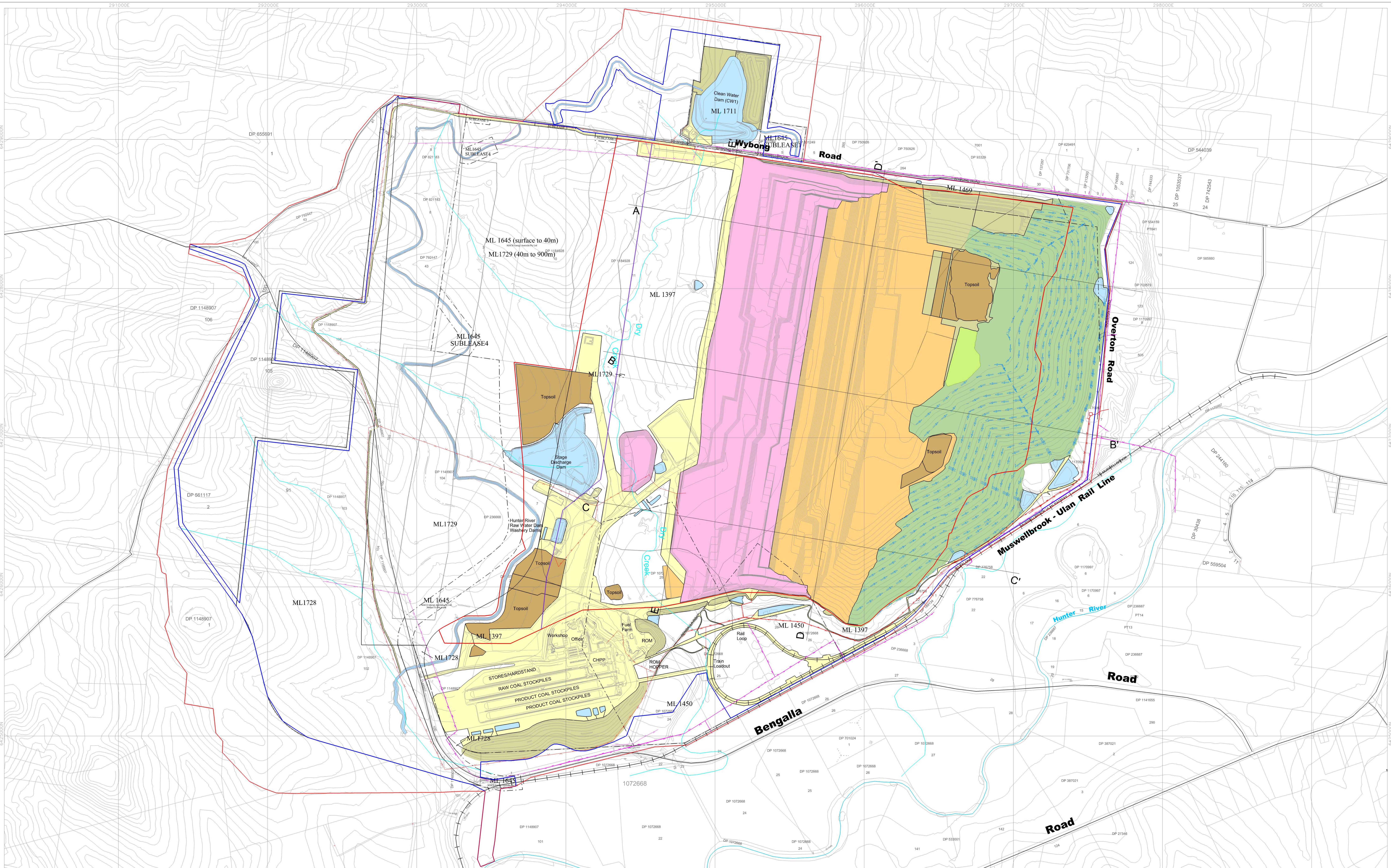
Registered Mine Surveyor Date: 24th Mar 2020
 J. Cam Halfpenny, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Ian Payne
 BMC Manager Mine Engineering Date: 25th Mar 2020

Bengalla Mining Company
 Bengalla Road
 LMB 5
 Muswellbrook, NSW, 2333

Bengalla Mine					
Mining Operations Plan (2017-2021) Amendment B					
PLAN 1C - Pre-Mining Environment - Built Environment					
Application Date: March 2020					
Date	Scale	Drawn	Checked	Approved	Plan Size
24th Mar 2020	1:25000	T.E.	I.P.	C.W.	A3

Plan 2 - Mine Domains at Commencement of MOP



- Bengalla Mine Project Boundary
- Disturbance Boundary
- Proposed Extraction Boundary
- Previous Extraction Boundary
- Bengalla Mine Lease Boundary
- - - Proposed Bengalla Mine Lease Boundary
- Colliery Holding Boundary
- Proposed Colliery Holding Boundary

- Powerlines
- Railway Line
- Feature
- Surface Contour
- Water Courses
- Buildings
- Mine Water Management
- Roads

- | Primary Domains | | Secondary Domains | |
|--|-------------------------|---|--|
| 6 | Active Mining | I | Final Void |
| 3 | Water Management | K | Rehabilitation - Class III Pasture |
| 1 | Infrastructure | D | Rehabilitation - Pasture |
| 4 | Overburden Emplacement | E | Rehabilitation - Woodland |
| 5 | Topsoil Stockpiles | L | Rehabilitation - Dry Creek Reinstatement |
| 10 | Temporary Stabilisation | M | Tree Restoration Areas |

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne
Registered Mine Surveyor 12th Dec 2018
Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell
BMC Manager Mine Engineering 12th Dec 2018
Date

BENGALLA

Bengalla Mining Company
Bengalla Road
LMB 5
Muswellbrook, NSW, 2333

Bengalla Mine

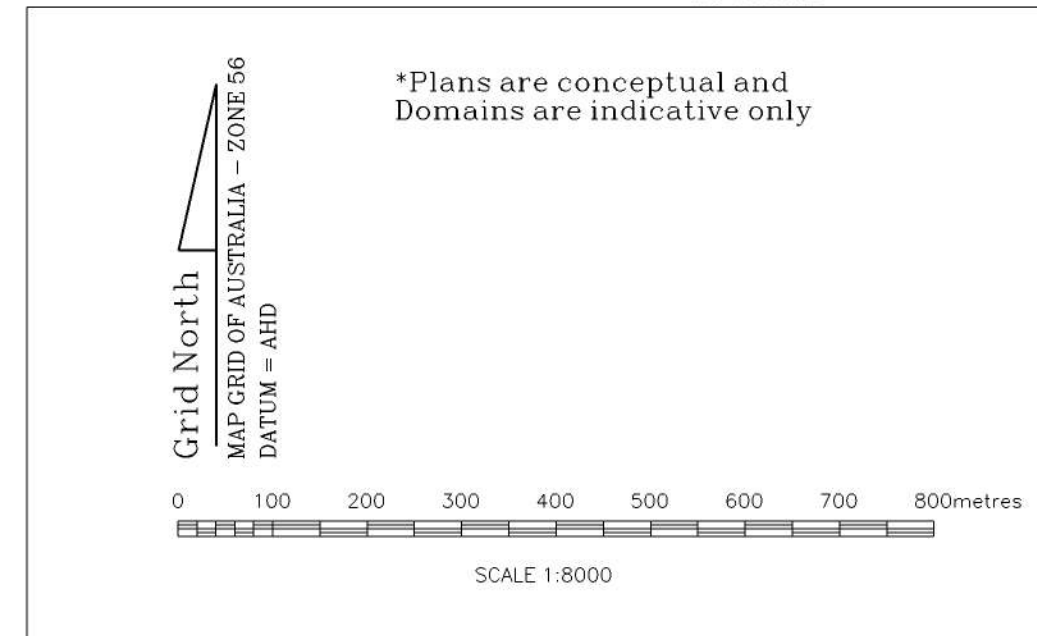
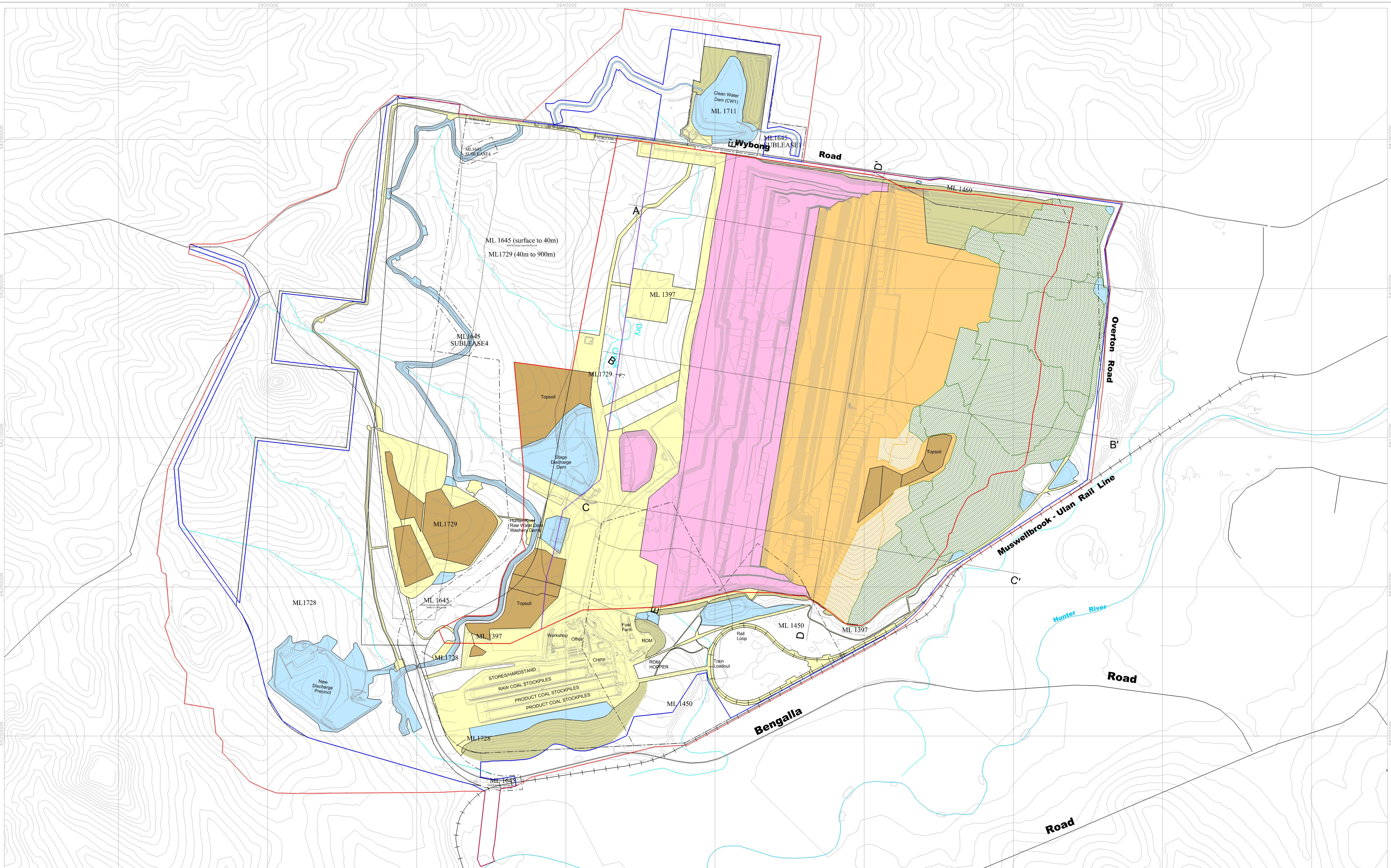
Mining Operations Plan (2017-2021) Amendment A

PLAN 2 – Mine Domains at Commencement of MOP (End 2016)

Application Date: February 2019

Date:	Scale:	Drawn:	Checked:	Approved:	Plan Size:
12th Dec 2018	1:8000	S.L.	I.P.	S.L.	A0

Plan 3A - Mining and Rehabilitation – 2017



*Plans are conceptual and Domains are indicative only

Bengalla Mine Project Boundary	Roads	6 Active Mining	I Final Void
Disturbance Boundary	Railway Line	3 Water Management	K Rehabilitation - Class III Pasture
Proposed Extraction Boundary	Rehabilitation Phases	1 Infrastructure	D Rehabilitation - Pasture
Previous Extraction Boundary	Decommissioning & Landform Establishment	4 Overburden Emplacement	E Rehabilitation - High Density Woody Vegetation
Bengalla Mine Lease Boundary	Growth Medium Development	5 Topsoil Stockpiles	L Rehabilitation - Dry Creek Reinstatement
Colliery Holding Boundary	Ecosystem Establishment	10 Temporary Stabilisation	M Tree Restoration Areas
Proposed Colliery Holding Boundary	Ecosystem Sustainability		
Surface Contour	Relinquished Lands		
Water Courses			

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne 12th Dec 2018
Registered Mine Surveyor Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell 12th Dec 2018
BMC Manager Mine Engineering Date

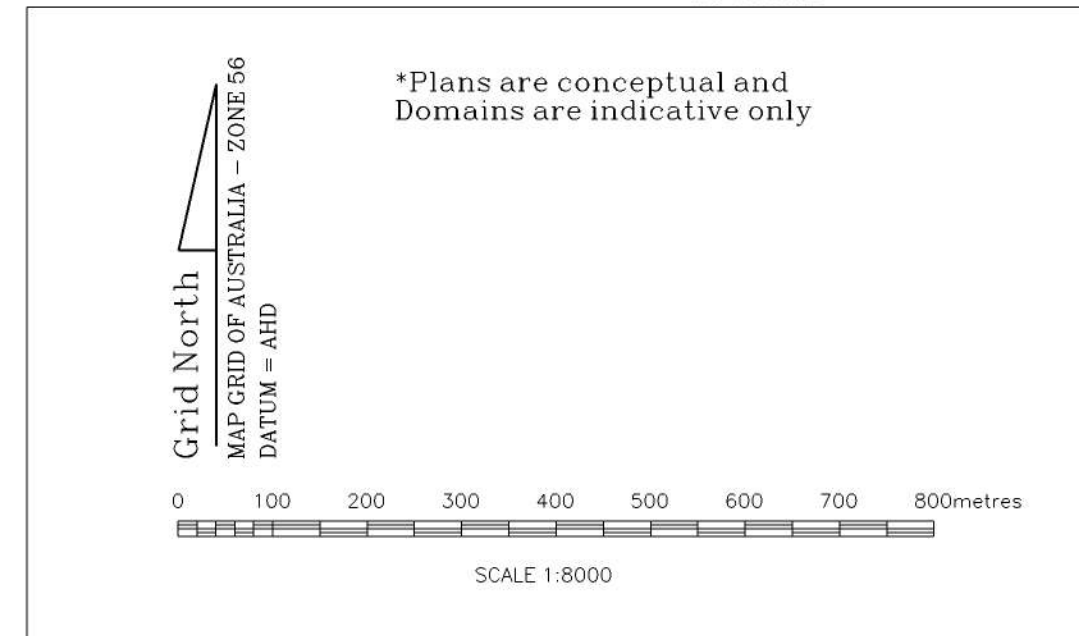
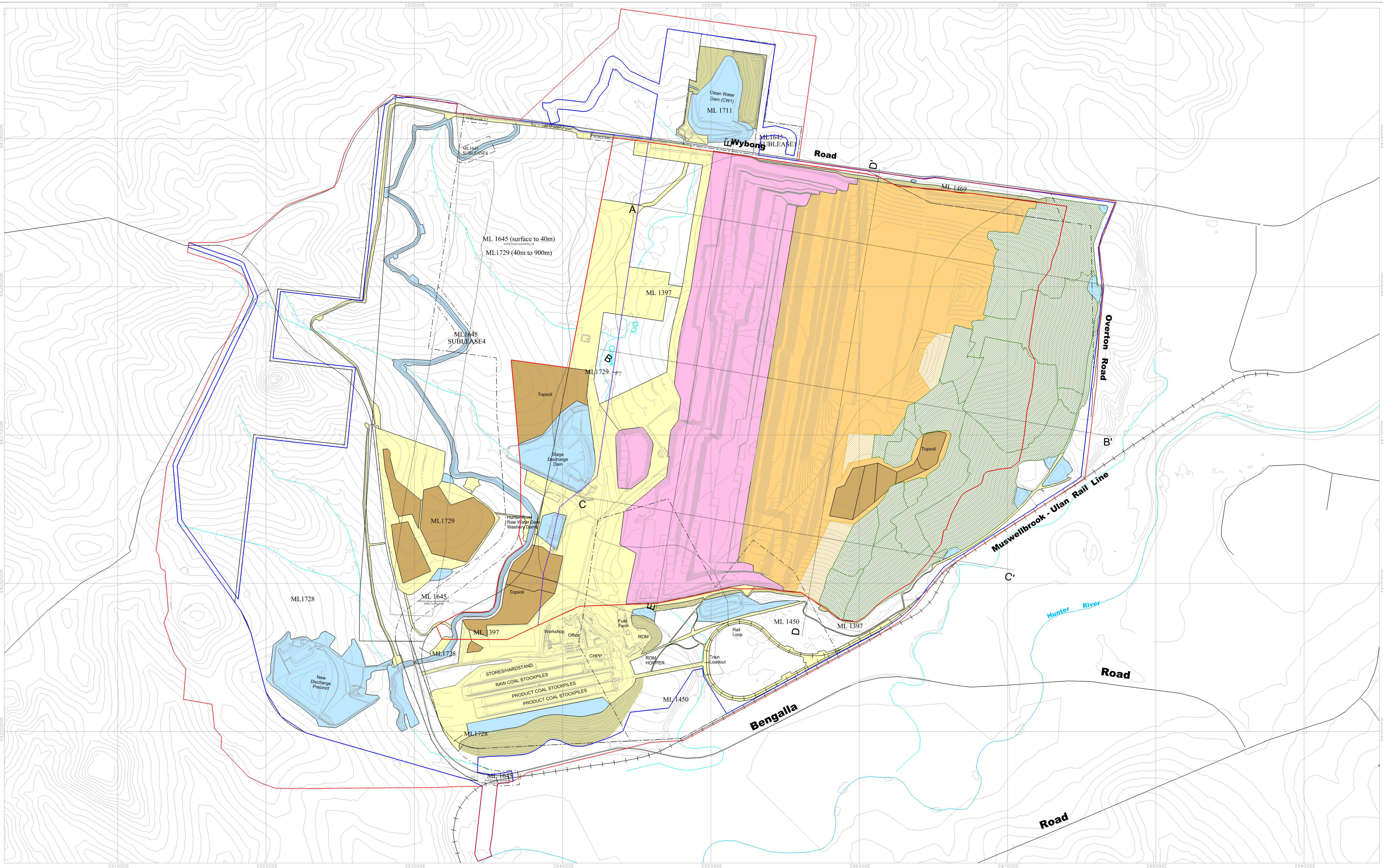
Bengalla Mining Company
Bengalla Road
LMB 5
Muswellbrook, NSW, 2333

Bengalla Mine

Mining Operations Plan (2017-2021) Amendment A
PLAN 3A - Conceptual Mining and Rehabilitation 2017
Application Date: February 2019

Date: 12th Dec 2018	Scale: 1:8000	Drawn: S.L.	Checked: I.P.	Approved: S.L.	Plan Size: AO
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Plan 3B - Mining and Rehabilitation – 2018



Bengalla Mine Project Boundary	Roads	6 Active Mining	I Final Void
Disturbance Boundary	Railway Line	3 Water Management	K Rehabilitation - Class III Pasture
Proposed Extraction Boundary	Rehabilitation Phases	1 Infrastructure	D Rehabilitation - Pasture
Previous Extraction Boundary	Decommissioning & Landform Establishment	4 Overburden Emplacement	E Rehabilitation - High Density Woody Vegetation
Bengalla Mine Lease Boundary	Growth Medium Development	5 Topsoil Stockpiles	L Rehabilitation - Dry Creek Reinstatement
Proposed Bengalla Mine Lease Boundary	Ecosystem Establishment	10 Temporary Stabilisation	M Tree Restoration Areas
Colliery Holding Boundary	Ecosystem Sustainability		
Proposed Colliery Holding Boundary	Relinquished Lands		
Surface Contour			
Water Courses			

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne
 Registered Mine Surveyor Date 12th Dec 2018

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell
 BMC Manager Mine Engineering Date 12th Dec 2018

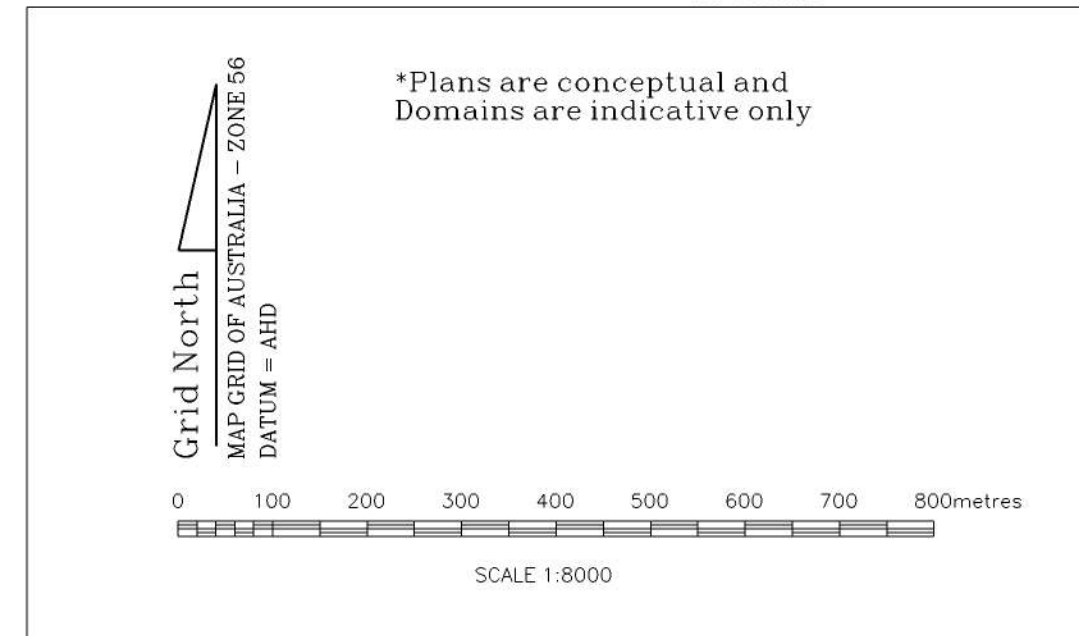
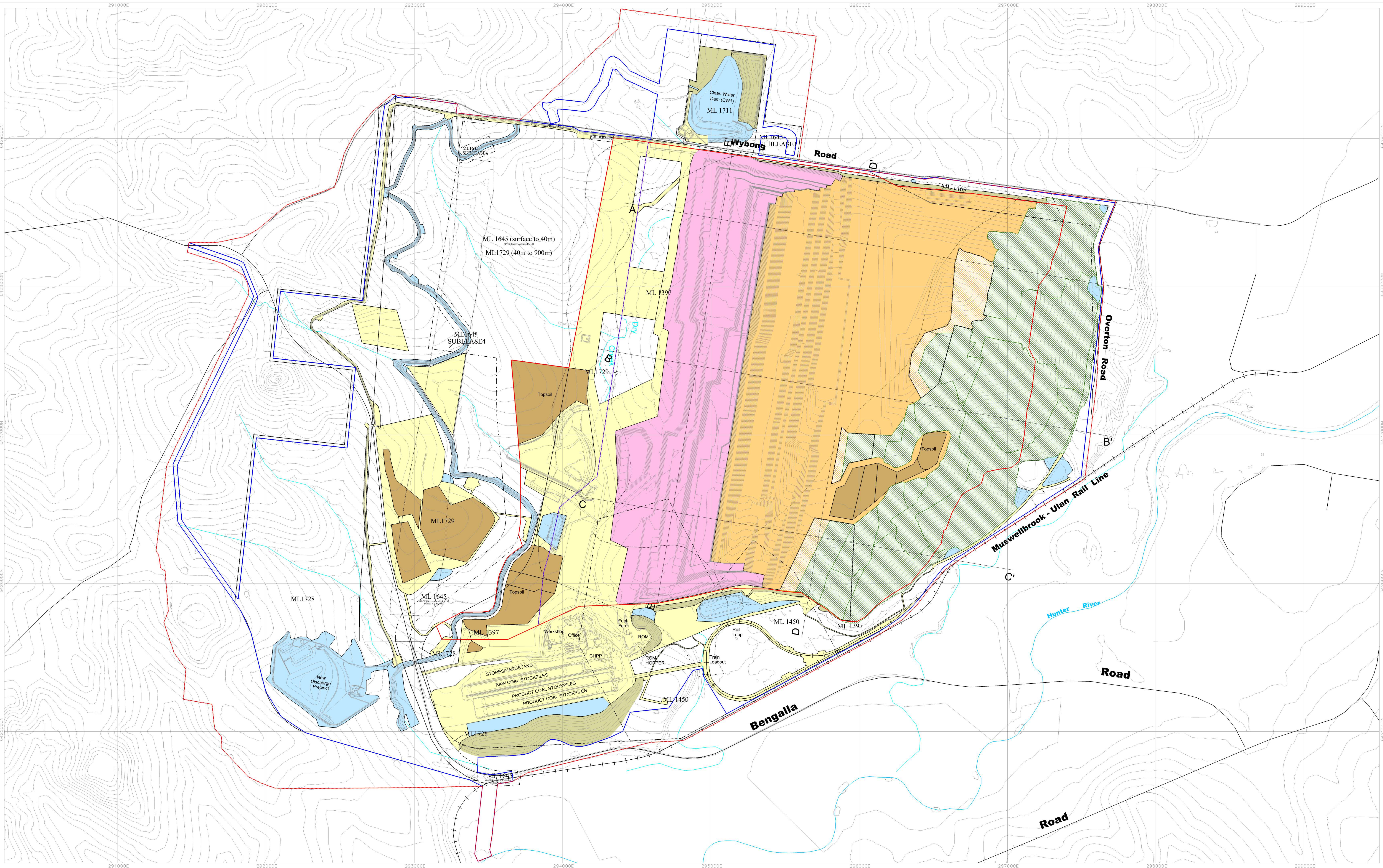
Bengalla Mining Company
 Bengalla Road
 LMB 5
 Muswellbrook, NSW, 2333

Bengalla Mine

Mining Operations Plan (2017-2021) Amendment A
 PLAN 3B - Conceptual Mining and Rehabilitation 2018
 Application Date: February 2019

Date: 12th Dec 2018	Scale: 1:8000	Drawn: S.L.	Checked: I.P.	Approved: S.L.	Plan Size: AO
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Plan 3C - Mining and Rehabilitation – 2019



*Plans are conceptual and Domains are indicative only

Bengalla Mine Project Boundary	Roads	Active Mining	Final Void
Disturbance Boundary	Railway Line	Water Management	Rehabilitation - Class III Pasture
Proposed Extraction Boundary	Rehabilitation Phases	Infrastructure	Rehabilitation - Pasture
Previous Extraction Boundary	Decommissioning & Landform Establishment	Overburden Emplacement	Rehabilitation - High Density Woody Vegetation
Bengalla Mine Lease Boundary	Growth Medium Development	Topsoil Stockpiles	Rehabilitation - Dry Creek Reinstatement
Colliery Holding Boundary	Ecosystem Establishment	Temporary Stabilisation	Tree Restoration Areas
Proposed Colliery Holding Boundary	Ecosystem Sustainability		
Surface Contour	Relinquished Lands		
Water Courses			
GeoFlux Landform			

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne 12th Dec 2018
Registered Mine Surveyor Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell 12th Dec 2018
BMC Manager Mine Engineering Date

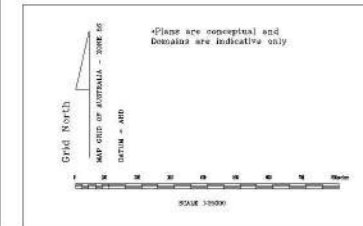
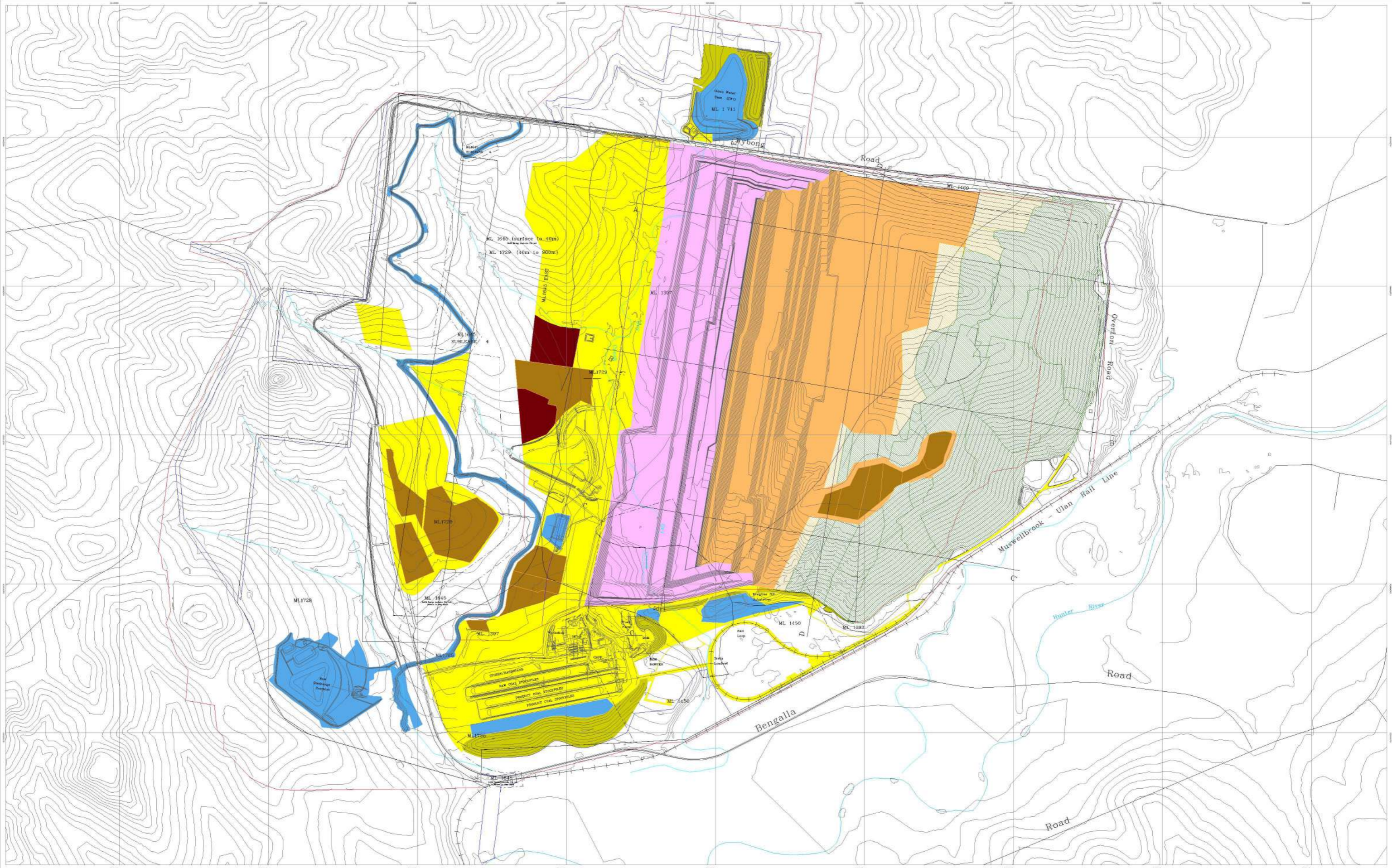
Bengalla Mining Company
Bengalla Road
LMB 5
Muswellbrook, NSW, 2333

Bengalla Mine

Mining Operations Plan (2017-2021) Amendment A
PLAN 3C - Conceptual Mining and Rehabilitation 2019
Application Date: February 2019

Date:	Scale:	Drawn:	Checked:	Approved:	Plan Size:
12th Dec 2018	1:8000	S.L.	I.P.	S.L.	AO

Plan 3D - Mining and Rehabilitation – 2020



Bengalla Mine Project Boundary	Road	Active Mining	Final Void
Extraction Boundary	Railway Line	Water Management	Rehabilitation - Class III Pasture
Proposed Extraction Boundary	Decommissioning & Landform Establishment	Infrastructure	Rehabilitation - Pasture
Previous Extraction Boundary	Growth Medium Development	Overburden Encapsulation	Rehabilitation - High Density Woody Vegetation
Bengalla Mine Lease Boundary	Ecosystem Establishment	Topsoil Stockpiles	Rehabilitation - Dry Creek Reinstatement
Proposed Bengalla Mine Lease Boundary	Ecosystem Sustainability	Clay Stockpiles	Tree Restoration Area
Existing Mining Boundary	Reinstated Lands	Temporary Stabilisation	
Proposed Existing Mining Boundary			
Surface Cuts			
Water Courses			
In-Pit Seepage			

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne
Registered Mine Surveyor
Date: 20 July 2020

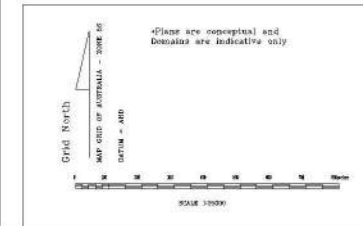
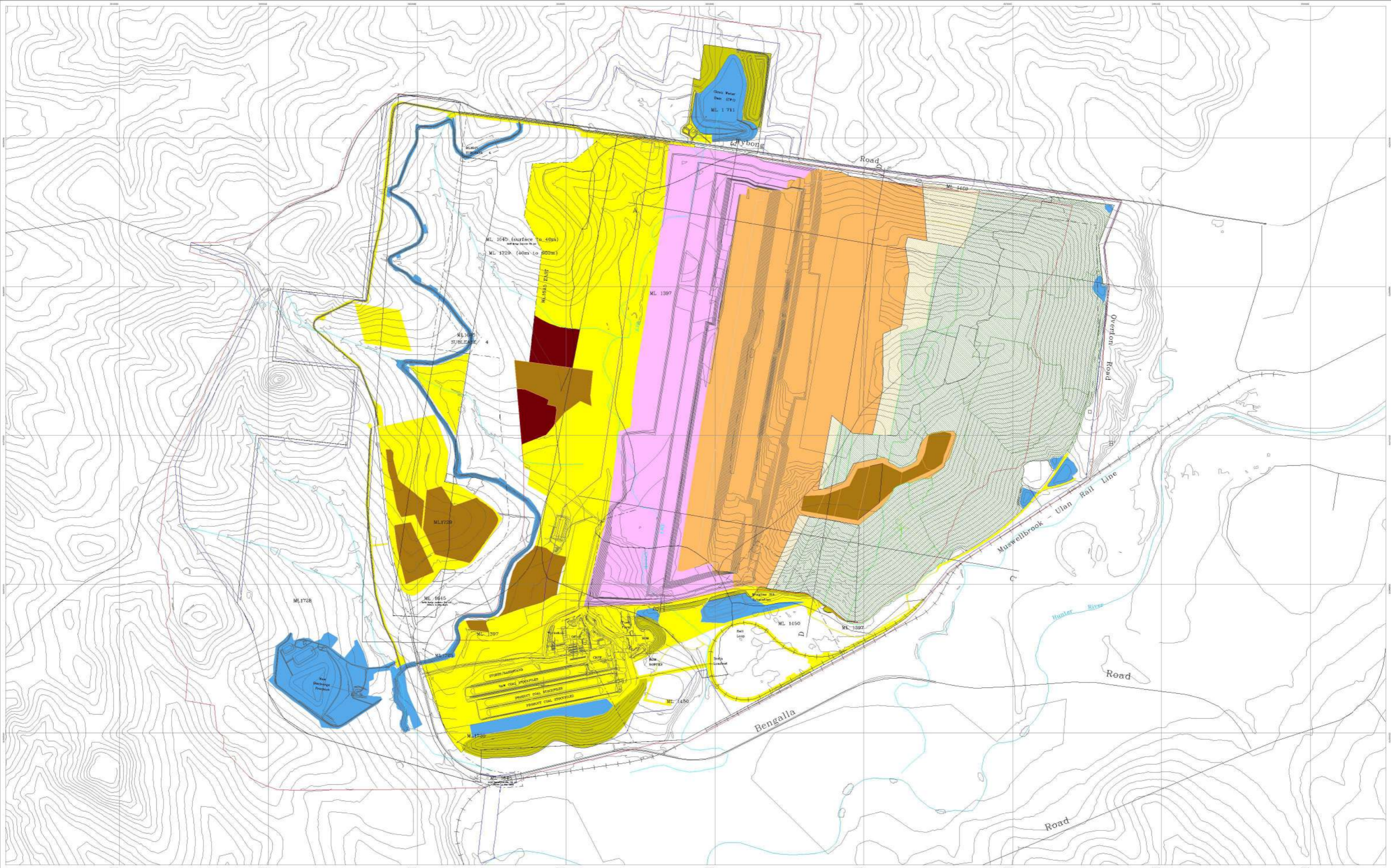
I, Cam Halpeny, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Cam Halpeny
BMC Manager Mine Engineering
Date: 20 July 2020

Bengalla Mining Company
Bengalla Road
LMB 5
Muswellbrook, NSW, 2333

Bengalla Mine					
Mining Operations Plan (2017-2021) Amendment A					
PLAN 3D - Conceptual Mining and Rehabilitation 2020					
Application Date: July 2020					
Date:	Scale:	Drawn:	Checked:	Approved:	Plan Size:
20 July 2020	1:25000	T.B.	I.P.	C.W.	A3

Plan 3E - Mining and Rehabilitation – 2021



Bengalla Mine Project Boundary	Roads	Active Mining	Final Void
Extraction Boundary	Railway Line	Water Management	Rehabilitation - Class III Pasture
Proposed Extraction Boundary	Rehabilitation Phases	Infrastructure	Rehabilitation - Pasture
Previous Extraction Boundary	Decommissioning & Landform Establishment	Overburden Encasement	Rehabilitation - High Density Woody Vegetation
Bengalla Mine Lease Boundary	Growth Medium Development	Topsoil Stockpiles	Rehabilitation - Dry Creek Reinstatement
Proposed Bengalla Mine Lease Boundary	Ecosystem Establishment	Clay Stockpiles	Tree Restoration Areas
Existing Mining Boundary	Ecosystem Sustainability	Temporary Stabilisation	
Proposed Existing Mining Boundary	Reinstated Lands		
Surface Cuts			
Water Courses			
In-Pit Lakes			

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne
Registered Mine Surveyor
Date: 20 July 2020

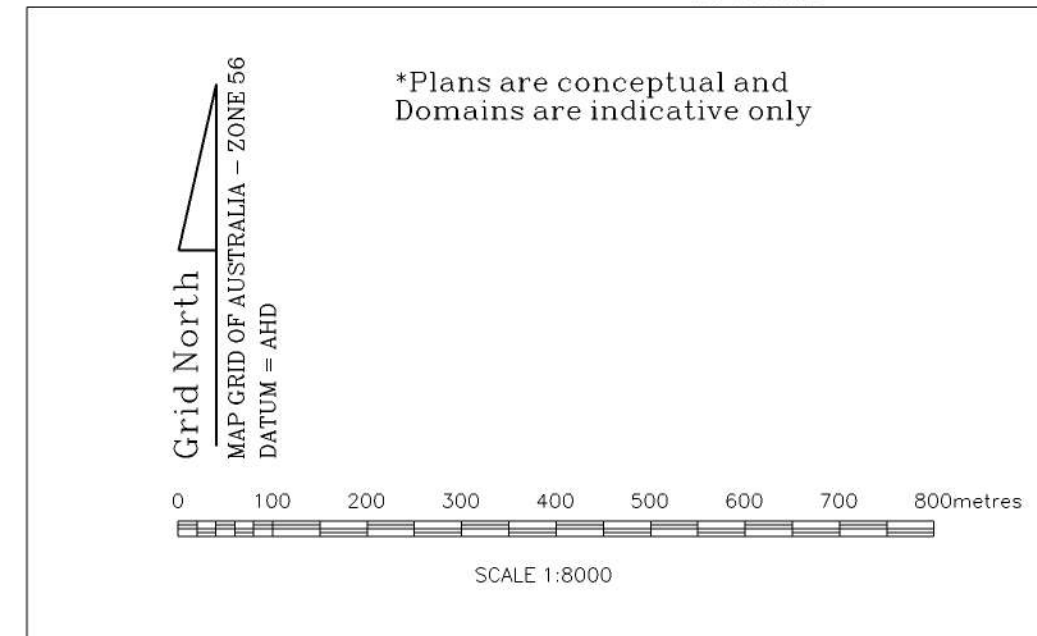
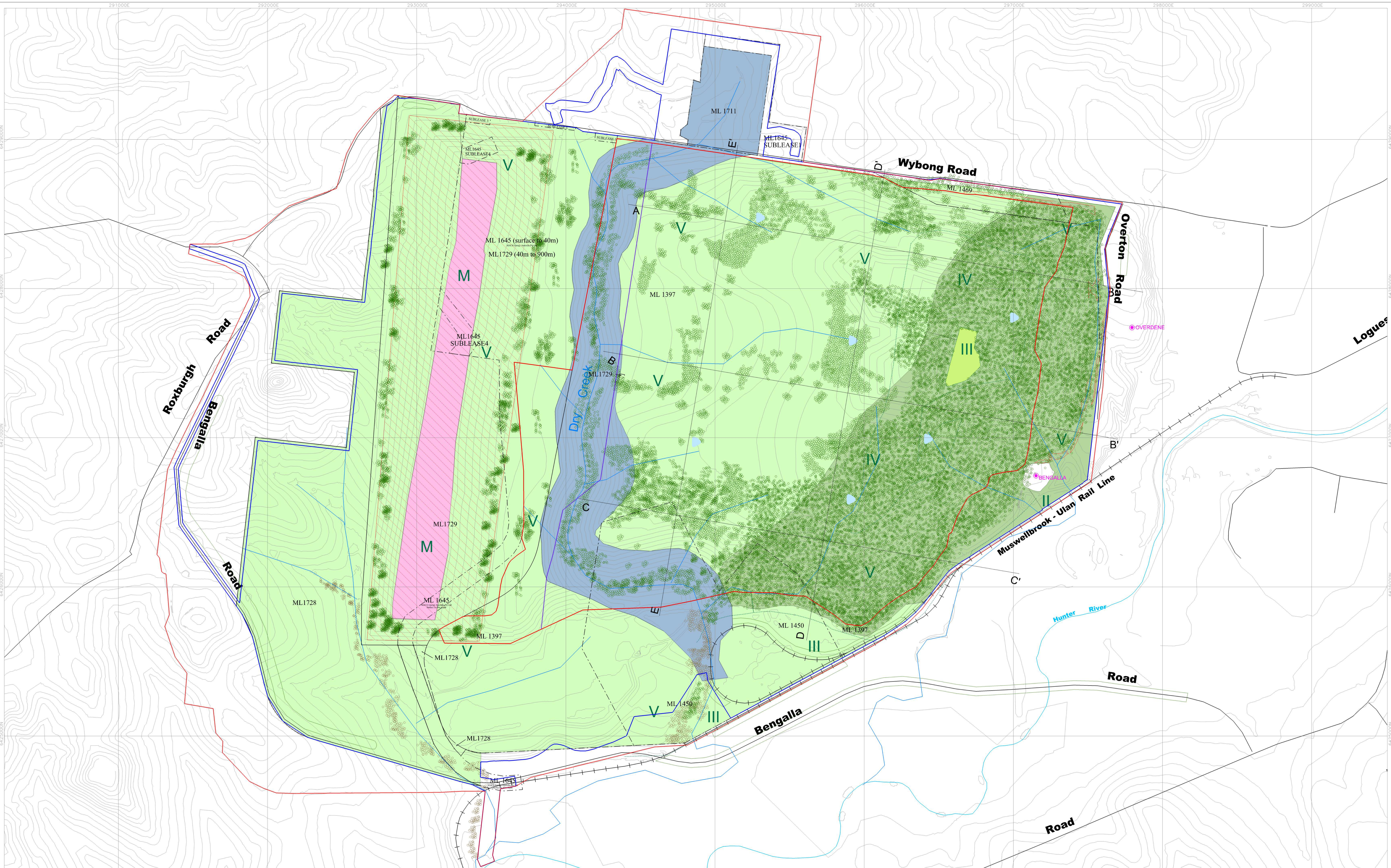
I, Cam Halpin, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Cam Halpin
BMC Manager Mine Engineering
Date: 20 July 2020



Bengalla Mine					
Mining Operations Plan (2017-2021) Amendment A					
PLAN 3E - Conceptual Mining and Rehabilitation 2021					
Application Date: July 2020					
Date:	Scale:	Drawn:	Checked:	Approved:	Plan Size:
20 July 2020	1:25000	T.B.	IP	C.W.	A3

Plan 4 - Final Rehabilitation and Post Mining Land use



- | | | | |
|---------------------------------------|-----------------|------------------------|--|
| Bengalla Mine Project Boundary | Heritage Site | Tree Screens | Final Void |
| Disturbance Boundary | Railway Line | Trees - Rehabilitation | Rehabilitation - Class III Pasture |
| Proposed Extraction Boundary | Feature | Trees - Restoration | Rehabilitation - Pasture |
| Previous Extraction Boundary | Surface Contour | >18 Degrees | Rehabilitation - High Density Woody Vegetation |
| Bengalla Mine Lease Boundary | Water Courses | Land Capability | Rehabilitation - Dry Creek Reinstatement |
| Proposed Bengalla Mine Lease Boundary | | | Tree Restoration Areas |
| Colliery Holding Boundary | | | |
| Proposed Colliery Holding Boundary | | | |

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne 12th Dec 2018
Registered Mine Surveyor Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell 12th Dec 2018
BMC Manager Mine Engineering Date

Bengalla Mining Company
Bengalla Road
LMB 5
Muswellbrook, NSW, 2333

Bengalla Mine

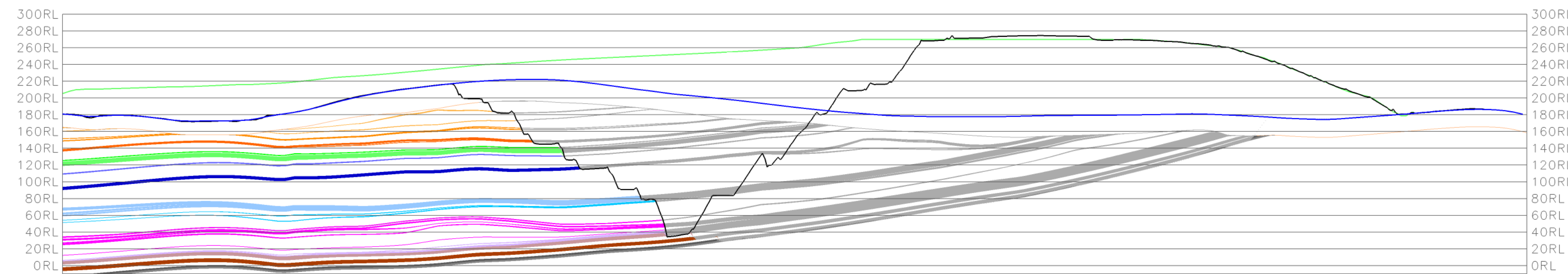
Mining Operations Plan (2017-2021) Amendment A
PLAN 4 - Conceptual Final Rehabilitation and Post Mining Land Use (2039)
Application Date: February 2019

Date:	Scale:	Drawn:	Checked:	Approved:	Plan Size:
12th Dec 2018	1:8000	S.L.	I.P.	S.L.	A0

Plan 5 - Rehabilitation and Post Mining Land use Cross Sections

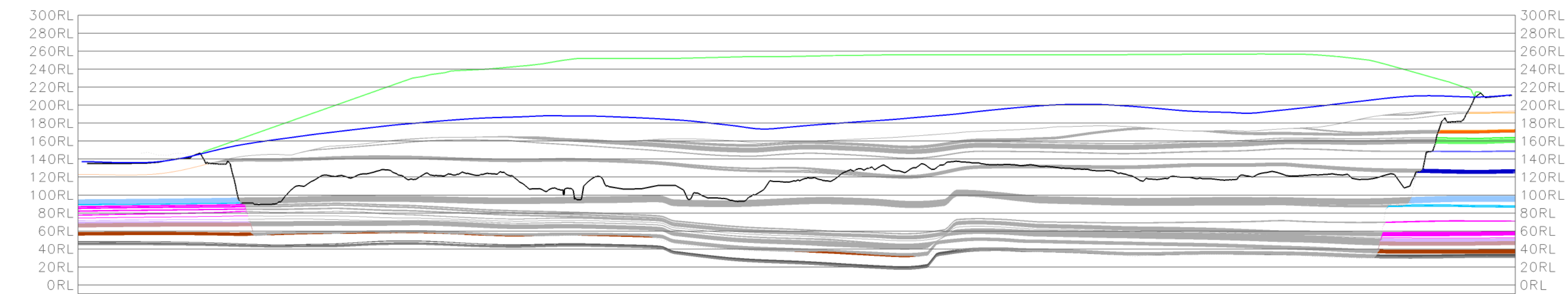
Section A-A'

Scale 2:1 (VER:HOR)



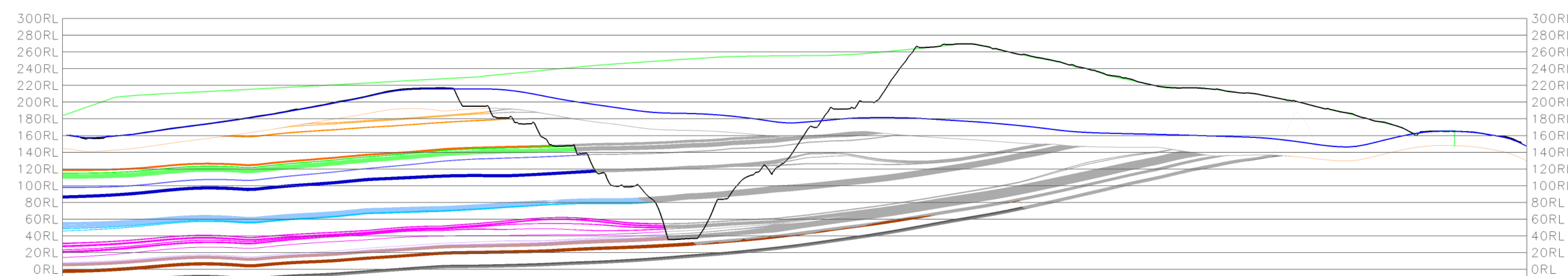
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Scale 2:1 (VER:HOR)



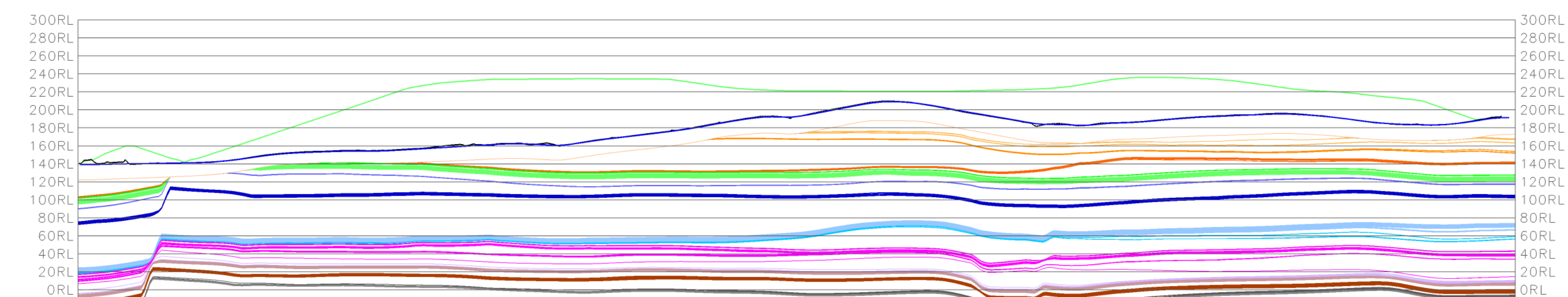
Section B-B'

Scale 2:1 (VER:HOR)



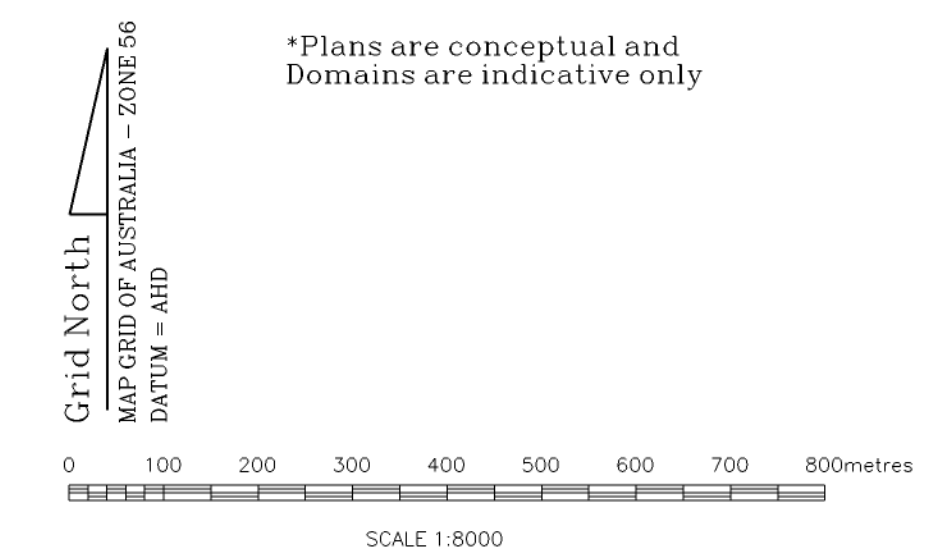
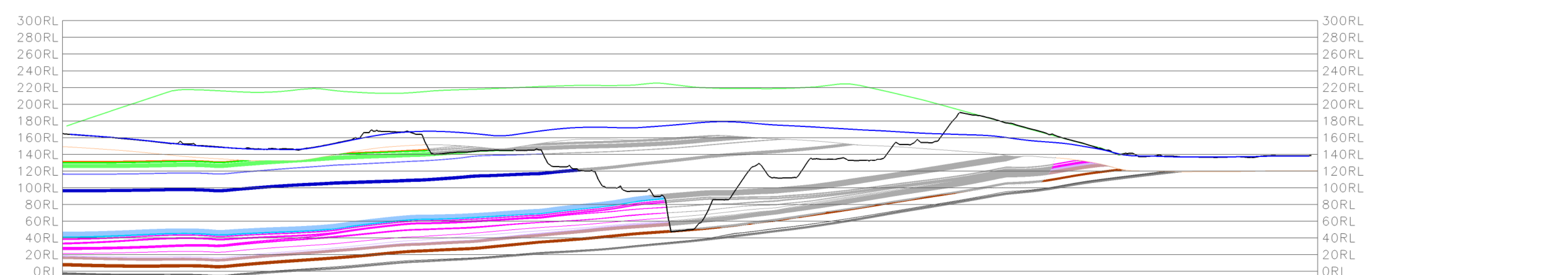
Section E-E'

Scale 2:1 (VER:HOR)



Section C-C'

Scale 2:1 (VER:HOR)



- Pre Mining Surface
- Existing Surface
- Conceptual Final Landform Surface

Seam Legend

- | | |
|--|--|
| — Warkworth Seam | — Broonie Seam |
| — Mt Arthur Seam | — Bayswater Seam |
| — Piercefield Seam | — Wynn Seam |
| — Vaux Seam | — Edderton Seam |

I, Ian Payne, Registered Mine Surveyor, certify that to the best of my knowledge and belief that the mine surveying content of this plan conforms to the accuracy & standards required by NSW Trade & Investment - division of Resources and Energy.

Ian Payne 12th Dec 2018
Registered Mine Surveyor Date

I, Heather Bell, BMC Manager Mine Engineering, certify that this plan represents the proposed development.

Heather Bell 12th Dec 2018
BMC Manager Mine Engineering Date



Bengalla Mine

Mining Operations Plan (2017-2021) Amendment A
PLAN 5 – Conceptual Rehabilitation & Post Mining Land Use Cross Sections

Application Date: February 2019

Date: 12th Dec 2018	Scale: 1:8000	Drawn: S.L.	Checked: I.P.	Approved: S.L.	Plan Size: A0
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13 Review and Implementation of the MOP

13.1 Review of the MOP

This section provides details on the protocol for reviewing and revising the MOP.

The MOP will be reviewed, and if necessary revised when:

- Any new Development Consent is granted.
- A new MOP is to be submitted.

This MOP may also be revised due to:

- Changing environmental requirements.
- Deficiencies of the MOP being identified.
- Changes in legislation.
- Result or recommendations from monitoring programs.
- Improvements in knowledge or technology.
- Where a risk assessment identifies the requirement to alter the MOP.
- Change in the activities or operations associated with Bengalla Mine.

13.2 Implementation

The following table defines the personnel who are responsible for the monitoring, review and implementation of this MOP.

Table 34: Responsibilities for implementation of the MOP

Title	Responsibility
Production / Mine Manager	<ul style="list-style-type: none"> • Implement the processes referenced in the MOP. • Provide training as required. • Provide resources required and support to implement these processes. • Allow for forward planning to prepare and bulk shape areas for rehabilitation.
Technical Services Manager	<ul style="list-style-type: none"> • Implement the processes referenced in the MOP. • Provide training as required. • Provide resources required and support to implement these processes. • Allow for forward planning to prepare and bulk shape areas for rehabilitation.
Environmental and Approvals Superintendent	<ul style="list-style-type: none"> • Implement, monitor and review the programmes and processes linked to this MOP. • Consult with regulatory authorities as required. • Undertake monitoring as required. • Undertake maintenance as required. • Provide measures for continual improvement to this MOP and processes. • Provide training as required. • Report as required in the AEMR.

14 References

- Agfacts – AC.25 – Agricultural Land Classification, NSW Agriculture.
- ACARP C20017 - Criteria For Functioning River Landscape Units In Mining And Post Mining Landscapes, March 2014.
- ANZECC (2000) Strategic Framework for Mine Closure.
- Bengalla Feasibility Study (1993).
- Bengalla DA 211/93 (as modified).
- Bengalla Environmental Impact Study (EIS) 2013.
- Bengalla DA SSD-5170 (as modified).
- Bengalla Response to Submissions (RTS) 2014.
- Bengalla DA SSD-5170 (2015a).
- Bengalla DA SSD-5170 (2015b).
- Bengalla DA SSD-5170 (2016).
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- Bengalla Mine - Landscape Management Plan.
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15 Acronyms

AHIP	Aboriginal Heritage Impact Permit
AL	Assessment Lease
ARD	Acid Rock Drainage
BJV	Bengalla Joint Venture Pty Ltd
BMC	Bengalla Mining Company
BMP	Biodiversity Management Plan
CCC	Community Consultative Committee
CHPP	Coal Handling Preparation Plant
DPiE	Department of Planning, Industry & Environment
DPiE-RR	Department of Planning, Industry & Environment Resources Regulator
DPI	Department of Primary Industries
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPL	Environmental Protection License
GDP	Ground Disturbance Permit
GPS	Global Positioning System
HRSTS	Hunter River Salinity Trading Scheme
LOX	Line of Oxidation
ML	Mining Lease
MOP	Mining Operations Plan
MSC	Muswellbrook Shire Council
NSW	New South Wales
OEA	Overburden Emplacement Area
OEH	Office of Environment and Heritage
RCE	Rehabilitation Cost Estimate
ROM	Run Of Mine
RTEMS	Real Time Environmental Monitoring System
SEE	Statement of Environmental Effects
SOEA	Southern Overburden Emplacement Area
TLO	Train Load Out
WOEA	Western Overburden Emplacement Area

Bengalla Mining Company Pty Limited
LOCKED MAIL BAG 5
MUSWELLBROOK NSW 2333
Attn: Cameron (Cam) Halfpenny

Dear Cameron (Cam) Halfpenny

ML 1592 (1992), ML 1729 (1992), ML 1469 (1992), ML 1711 (1992), ML 1397 (1992), ML 1728 (1992), ML 1450 (1992), Bengalla Mining Company Pty Limited, Approval of Mining Operations Plan and Assessment of Security Deposit

NOTICE OF APPROVAL

Pursuant to the relevant Condition of ML 1592 (1992), ML 1729 (1992), ML 1469 (1992), ML 1711 (1992), ML 1397 (1992), ML 1728 (1992), ML 1450 (1992), the Mining Operations Plan (MOP) that was submitted to the Resources Regulator on 7 May 2020 (Department Reference: MAAG0007022) is approved for the period from the date of this approval until **31 December 2021**.

It is the responsibility of the Authorisation Holder to ensure that all mining and mining related operations described in this MOP are as approved within the relevant Project Approval or Development Consent and all necessary approvals, consents or permits required under the relevant NSW or Commonwealth regulations have been obtained prior to carrying out the operations.

It is the responsibility of the Authorisation Holder to fulfil their obligations and commitments to the rehabilitation outcomes and performance standards as approved by the relevant consent authority to ensure the rehabilitation outcomes identified are achieved.

ASSESSED DEPOSIT

Notice of any change in the security deposit condition related to this MOP approval will be provided separately.

DEFINITIONS

In this letter, words have the meaning given to those terms in the *Mining Act 1992*, unless otherwise specified below.

Assessed Deposit has the meaning given by section 261BC of the *Mining Act 1992*.

Authorisation Holder means the holder of the relevant authorisation(s).

Mining Operations Plan means the project, mining and mining related operations described in the Bengalla Mine Mining Operations Plan 2017-2021 (Amendment B)

SSD-5170 (as modified) prepared by Bengalla Mining Company Pty Limited, dated 7 May 2020.

As amended by 'Bengalla Mine Mining Operations Plan 2017-2021 (Amendment B) SSD-5170 (as modified) prepared by Bengalla Mining Company Pty Limited, dated 20 July 2020'.

Signed under delegation from the Minister for Resources and the Secretary Department Regional NSW.

If you require additional information, please contact the Resources Regulator on 1300 814 609 or via email at nswresourcesregulator@service-now.com.

Yours sincerely,

Peter Ainsworth
Manager Environmental Operations
Resources Regulator

28 October 2020

Other copies provided by email to: Craig White