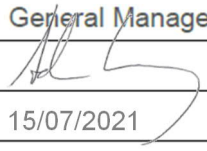
MAC-ENC-MTP-052

Mt Arthur Coal: Forward Program

Brief description

The purpose of the Mine Operations Plan (MOP) is to provide the next 3-year mining and rehabilitation schedule, a summary of the spatial progression of rehabilitation (rehabilitation phase), and is the basis for calculation of the rehabilitation cost estimate (RCE). From this point on, the MOP will be referred to as the Annual Forward Program (AFP) and the Rehabilitation Management Plan (RMP).

Mt Arthur Coal Mining Operations Plan Lease Block	
Name of Mine:	Mt Arthur Coal
Commencement Date:	1 September 2021
Completion Date:	30 June 2024
Mining Authorisations (Lease/License No.):	CCL 744, CL 396, ML 1358, ML 1487, ML 1548, ML 1593, ML 1655, MPL 263, A 171, A 437, EL 5965, Sublease CL 229, ML 1757, ML 1739, Sublease CL 395
Name of Authorisation / Lease Holder:	Hunter Valley Energy Coal Pty Ltd Mt Arthur Coal Pty Limited
Name of Mine Operator:	Mt Arthur Coal Pty Limited
Name and Contact Details of the Mine Manager (or equivalent):	Adam Lancey, General Manager Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Ph: 02 6544 5566 Email: Adam.Lancey@bhp.com
Name and Contact Details of Environmental Representative:	Hannah Farr, Manager HSE Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Email: Hannah.j.farr@bhp.com
The information provided in this document is true and correct. Name of Representative(s) of the Authorisation Holder(s): Adam Lancey	
Title:	General Manager Mt Arthur Coal
Signature:	
Date:	15/07/2021
Version 4.0 – June 2021	Mt Arthur Coal - Forward Program FY22 – FY24

Mt Arthur Coal: Forward Program

Key contacts

Action	Person	Title
Rehabilitation Planning	Damien Williams	Manager Technical Services
Rehabilitation Governance	Hannah Farr	Manager HSE
Document Owner	Emma White	Superintendent Midterm Planning
Document Approver	Adam Lancey	General Manager

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Mt Arthur Coal: Forward Program

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Mt Arthur Coal: Forward Program

Intent

The intent of this Mining Operations Plan (Annual Forward Program (AFP)) is to allow continued mining operations at Mt Arthur Coal, for the Mt Arthur Coal Modification Project PA 09_0062 MOD 1. This AFP provides information pertaining to operating philosophy, mining method, and rehabilitation management and reporting, water management and environmental management associated with current operations.

Other consents, approvals or permissions may be required depending on the nature and scale of the activities, the location and the associated environmental risks. These may include, but are not limited to:

- an environment protection licence under the Protection of the Environment Operations Act 1997 regulating noise, air, water and waste;
- licences or approvals under the Water Management Act 2000 or the Water Act 1912, for activities or works that take, divert or use water; and
- approvals for actions likely to have a significant impact on a matter of national environmental significance under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

The lease holder remains responsible for ensuring that all operations, including the rehabilitation of the Land, are completed in compliance with the conditions of the mining lease, as well as the conditions of other relevant approvals such as the development consent.

Mining, overburden emplacement and infrastructure areas may be brought forward from any year during the Forward Program period, dependant on mine schedule requirements. Actual disturbance and rehabilitation is reported annually in the Annual Environmental Management Review.

Application

This Plan applies to the following Mt Arthur Coal representatives:

- All BHP employees and contract staff
- All Partnering contractor company representatives
- All Subcontractor company representatives.

Abbreviations

AFP	Annual Forward Program
BCM	Bank cubic metres
BMP	Biodiversity Management Plan
CCL	Consolidated coal lease
CHPP	Coal handling preparation plant
CL	Coal lease
EL	Exploration licence
EPA	NSW Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC	Environment Protection and Biodiversity Conservation
EPL	Environment Protection Licence
EMS	Environmental Management System
ESCP	Erosion and Sediment Control Plan
FY	Financial year
HA	Hectares
HSE	Health, Safety and Environment
HVEC	Hunter valley Energy Coal (MT Arthur Coal)

ISO	International Standards Organisation
LGA	Local government area
MAC	Mt Arthur Coal
ML	Mining lease
MOP	Mining Operations Plan
MPL	Mining purpose lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NGO	Non-government organisation
NSW	New South Wales
PA	Project Approval
RAP	Remedial Action Plan
RCE	Rehabilitation Cost Estimate
RMP	Rehabilitation Management Plan
ROM	Run of Mine

Definitions

- **Hunter Valley Energy Coal Pty Ltd -** operates the Mt Arthur Coal Complex which consists of the approved open cut mining operations, a rail loop and associated rail loading facilities (PA 09_0062) and the Mt Arthur Underground Project (PA 06_0091),
- **The Project Approval -** Project Approval (PA 09_0062) MOD 1 Mt Arthur Coal Mine – Open Cut Modification Project dated 26 September 2014.
- **Mine Operations Plan –** The combination of the Annual Forward Program and the Rehabilitation Management Plan
- **The Annual Forward Program -** a program that specifies all rehabilitation, monitoring and related activities on, in, under or over the Land for the next 3 years.
- **Rehabilitation Management Plan (RMP) -** The Rehabilitation Management Plan approved under Condition 44 of the Mt Arthur Coal Modification Project PA 09_0062 MOD 1 under Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act). Condition 44 requires the project proponent to prepare and implement a Rehabilitation Management Plan for the Project.

1 Three year mining activities forecast

1.1 Project Description

Hunter Valley Energy Coal Pty Ltd (HVEC) operates Mt Arthur Coal (MAC), which consists of an approved open cut and underground mining operation, a rail loop and associated rail loading facilities. The MAC Mine is located approximately 5 kilometres south west of Muswellbrook within the Muswellbrook Shire Local Government Area (LGA) in the Upper Hunter Valley of NSW. The location of MAC is shown in Plan 1A.

MAC is an open cut coal mine operating with trucks and shovels to extract up to 32Mtpa of ROM coal. The majority of coal is crushed and washed, prior to export markets. MAC has development consent approval to operate until 30 June 2026. A study to support an application to continue operations beyond 2026 is currently underway. The general sequence and staging of mining operations over the life of the operation will be consistent with the methods described in Section 1.2.3.

MAC operates under a modified Project Approval (PA 09-0062 MOD 1). The Project Approval can be found at the following website http://www.bhpbilliton.com/environment/regulatory-information. The Project Approval currently authorises mining operations at MAC until 30 June 2026. HVEC intends to seek approval to continue mining operations at MAC beyond 2026. Substantial work is already underway to support this application to continue operations.

1.2 Description of Activities

1.2.1 Exploration

Exploration activities may be undertaken on Mining Act Authorities cover by this plan. These activities may include techniques allowed by these authorities.

An exploration drilling program may be undertaken on a campaign basis and subject to operational requirements throughout this AFP period. All exploration boreholes on Mining Leases will be drilled following ecological and cultural heritage (Aboriginal and European) due diligence inspections. Activities on Exploration licences will be undertaken as required by the Licence conditions.

1.2.2 Construction

Construction of infrastructure to support the open cut development will continue during this AFP period. The major construction and demolition activities proposed during this AFP period include:

- The new overburden emplacement area (Conveyor Corridor Overburden Emplacement Area) will continue its progression throughout this AFP period.
- The installation of temporary and permanent erosion sediment control structures required for the operation.
- The relocation of substations and the construction, relocation, and removal of power lines.
- A new overburden emplacement area (OP1N), relevant haul roads and required erosion and sediment controls will be constructed in this AFP period.
- The continuation of the construction of the Tailings Storage Facility (TSF) lift. MAC TSF Stage 2 Phase B project, including the raising the south west valley TSF wall, and changes to infrastructure to allow construction.
- The demolition of the disused Bayswater Infrastructure Area, dependent on the need for tailings expansion.
- Additional water pipelines, pumps and tracks for inspections to support ongoing water management strategies.
- Additional mine infrastructure as part of ongoing upgrades consistent with existing approvals including fill stands, crib huts and maintenance pads.

- Upgrading of haul road infrastructure around the coal export stockpile to allow for separation of heavy and light vehicles.
- The installation of additional mine infrastructure to improve tailings deposition and TSF future rehabilitation works.
- Visual amenity works will be completed along Edderton Rd to minimise visual impact of the operation in its surroundings.
- The installation of additional and/or upgraded mine infrastructure for noise, dust and water monitoring will occur on-lease and off-lease.
- Closure and capping and rehabilitation of the North cut tailings dam combined with the decommissioning of the Main dam and Dam 4 will continue in the AFP period.
- The North Cut closure activity time frames are dependent on the drying and consolidation process outcomes. Below are key milestones for the project:
    - drying and consolidation
    - capping
    - top soiling and seeding

1.2.3 Mining Operations

During FY21, mining occurred in the Windmill, Calool, Roxburgh, Ayredale and Saddlers pits. Overburden was placed on the conveyor corridor, CD areas, VD areas, Saddlers North and Belmont.

During this three year term, approximately 62.8 million tonnes of ROM coal is planned to be mined using truck and shovel and/or excavator methods for an equivalent 45.5 million tonnes of product coal. This method is consistent with current and previous site open cut operations.

During this AFP period, mining is proposed to continue within the extended pit shell of Mt Arthur, consisting of:

- Windmill Pit;
- Calool Pit;
- Roxburgh Pit;
- Ayredale Pit; and
- Saddlers Pit.

Prior to excavation of a new open cut strip, pre-stripping operations ensure that natural resources such as vegetation and topsoil are cleared and, where appropriate, recovered for subsequent use in post-mining rehabilitation. Rock strata overlying coal resources (overburden) is drilled and blasted to fracture the rock and facilitate overburden excavation. Hydraulic excavators and electric rope shovels then excavate and load blasted overburden into large haul trucks. These trucks transport the overburden material to designated emplacement areas.

After removing the overburden, the exposed coal seam is mined using hydraulic excavators and loaders. The ROM coal extracted is delivered by haul trucks to either the hopper bins that feed into the CHPP or to the ROM coal stockpiles. After crushing to size and processing to remove impurities, coal is stockpiled prior to transport from site by rail.

The general sequence of mining used at MAC is shown in Figure 1.

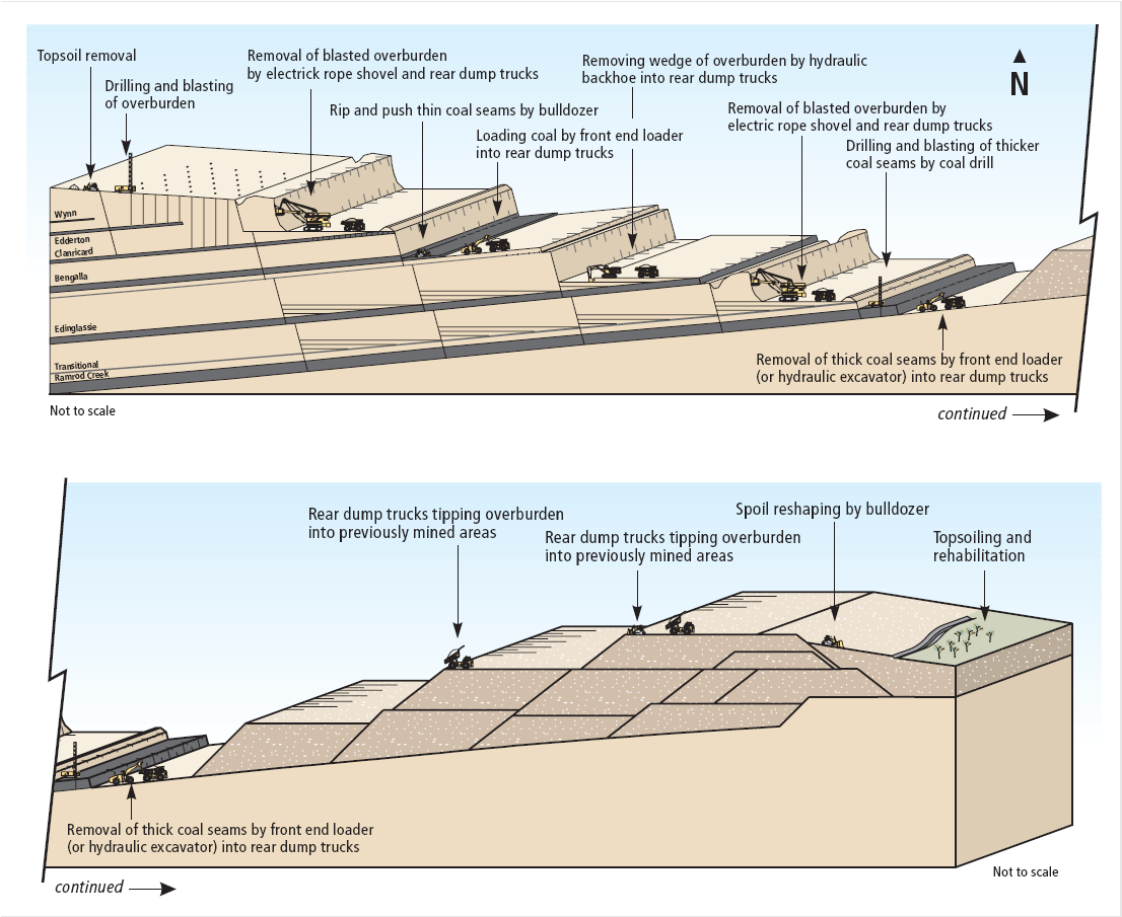


Figure 1: Mining sequence from topsoil removal to rehabilitation

1.2.4 Overburden Emplacement

During this three year term approximately 391 million bank cubic metres of overburden has been identified for transportation and placement by dump trucks. Emplacement areas are generally located within the open cut pit shell on the low wall side of the active pit. However there will be movement to HW (Belmont, OP1N and SDn) dumps. Overburden emplacement areas that will be utilised during this AFP period include:

- Visual Dumps 1 – 5 (VD1-5);
- Contingency Dumps 1 – 5 (CD1-5);
- Saddlers Dump 1-3 (SD1-3);
- Belmont Void
- Out of Pit Dumps 1N (OP1N) (Previously known as southwest Overburden emplacement area) and 1S (OP1S)
- Tailings Emplacement Expansion walls;
- Conveyor Corridor Overburden Emplacement Area;
- Drayton Void Overburden Emplacement Area; and
- Ayredale Pit

With the exception of the tailings emplacement expansion walls, these emplacement areas are designed by mine planning engineers. The extended tailings emplacement walls were designed by an external consultant. Survey control during emplacement is undertaken by the surveyor teams, under the direction of mine planners. Operational management of the emplacements is undertaken by mine Open Cut Examiners (OCE), who supervise overburden placement.

Overburden emplacement design incorporates considerations such as capacity, access, shape and lift height, as well as safety and environmental constraints. Emplacement areas are constructed with positive drainage to ensure emplacements shed water away from the active pit. North Pit emplacements (VD1-5 and CD1-5) approximate level of RL 375m to create visual relief. Emplacement design and construction also incorporates hostile material management considerations. The Out of Pit Dump South (OP1S) is still in the design stage and will be finalised closer to the due date.

1.2.5 Processing Residues and Tailings

Coal handling and processing is undertaken within the centralised coal handling and preparation plant (CHPP) located within Mining Lease ML1487. ROM coal extracted by the approved open cut operations is delivered by truck to either the ROM coal bins or the CHPP ROM coal stockpile. Following processing at the CHPP, coal is loaded onto trains via the rail loading facility for delivery to the export market.

Approximately 17 million tonnes of reject material will be produced from the CHPP during this AFP period. Coarse reject material will continue to be co-disposed within overburden emplacement areas or utilised in the construction of stockpile pads, roads or other infrastructure. Fine reject (tailings) will continue to be pumped from the CHPP to the existing approved Tailings Storage Facility (TSF). The TSF is shown in Plan 2 and is planned to be expanded in the AFP period as discussed in Section 2.

Construction of Stage 2 lift of the approved TSF is planned for this AFP period.

MAC is planning to commence the implementation of actions to prepare for the future capping of the TSF's as soon as practically possible. MAC is progressing through a review of its tailings strategy including the optimal mechanism for closure and capping of tailings dams. This review is expected to be complete by September. Following the review MAC will consider the recommendations and implement the preferred approach.

Capping and rehabilitation of the close North Cut Tailings facility is planned for this AFP period.

1.2.6 Waste Management

MAC's waste management system has been designed to minimise the generation of waste, maximise reuse and recycling, and meet regulatory requirements. This system consolidates the disposal, tracking and reporting of all waste generated on site. Waste generated as part of MAC's mining activities is sent off site for management. Recycled waste, represents approximately 80 per cent of total waste generated.

All hydrocarbon handling and storage areas (i.e. diesel storage areas and fill points) are appropriately designed and constructed, incorporating sealed concrete surfaces, bunding and oily water separators, where required. The Contaminated Land Management procedure also outlines the requirements for investigating, reporting, handling and treating contaminated land. Small volumes of hydrocarbon contaminated material are recovered and disposed of via the regulated waste management system or remediated at the onsite bioremediation facility.

1.2.7 Material Production Schedule during Forward Program Term

The indicative material production schedule during this Forward Program period is presented in Table 1. Material movement can vary depending on efficiency of mining and production constraints.

Table 1: Material production schedule during the AFP term

Material	Unit	Current FY21 (July 2020 – June 2021)	Year 1 FY22 (July 2021 – June 2022)	Year 2 FY23 (July 2022– June 2023)	Year 3 FY24 (July 2023 – June 2024)
Topsoil Stripping	kBCM	242	814	690	1,214
Prime Rock/ Overburden	kBCM	115,257	135,394	127,753	130,112
ROM Coal	Mt	20	21.3	21.6	19.9
Reject Material	Mt	4.2	6.3	5.3	5.7
Product	Mt	14.1	14.9	16.3	14.2

1.2.8 Water Management

Existing structures will be maintained to support the segregation and diversion of clean water, and control sediment-laden run-off prior to release. Existing sediment control structures may also require modification or upgrade as open cut mining progresses within the AFP disturbance boundary in accordance with the Mt Arthur Erosion and Sediment Control Plan (ESCP).

As a result of a risk evaluation Main Dam has been decommissioned and mine water re-routed to the CHPP Dirty Water dam. The Drayton Void, Belmont, MacDonalds and Saddler's pits, along with temporary storages in active pits, would also be used as remote or alternate mine water storages (refer to Plan 2) to provide a flexible water network system for maximum practical capacity and water security. The Main Dam decommissioning project will continue during this AFP period.

1.2.9 Decommissioning and Demolition Activities

As part of the tailings dam expansion project, the footprint of the expanded dam will extend over the existing tailings dams SP1, SP2 and SP3, which have been decommissioned and capped. The North Cut Tailings Dam, Main Dam and Dam 4 have been decommissioned and capping of these structures is expected to commence during this AFP period. Capping design is currently being completed and capping timing is to be defined on design finalisation.

Stage 2 of the tailings dam wall raise will not remove all of the decommissioned Bayswater facilities, however, some minor demolition / removal of old infrastructure may still occur within the AFP period. Removal of the Bayswater facilities will likely occur as part of Stage 3 of the tailings expansion works at a later date. A remedial action plan (RAP) has been completed and approved by the DP&E as required in PA 09_0062 MOD 1.

2 Three Year Rehabilitation Forecast

2.1 Rehabilitation Planning Activities

During this three year period, MAC will continue to undertake progressive rehabilitation of the site.

Supplementary planting of targeted rehabilitated areas with native woodland species is planned to expand the area of woodland rehabilitation. The supplementary woodland areas will focus on steep areas less suitable for grazing. General rehabilitation, land management and biodiversity enhancement activities will also continue over previously rehabilitated areas as shown in Figures 2, 3 and 4, including:

- Rehabilitation and ecological monitoring;
- Detailed soil assessments of existing rehabilitation to track the development growth media development/of soil profiles and feed into understanding what rehabilitation has been successful;

- Weed assessments to enable more targeted weed control. Trials in advanced weed assessment using aerial imagery;
- Weed control trials to investigate the efficacy of slashing and burning off to control exotic grasses;
- Pest animal control programs including kangaroo harvesting and rabbit baiting/trapping;
- Supplementary tubestock planting during suitable weather;
- Habitat enhancement through placement of stag trees and piling of thinned timber;
- Trials in the use of surface stabilisation (mulch) to reduce short term erosion risks; and
- Application of ameliorants (fertiliser and gypsum).

Areas targeted for maintenance and improvement works will focus on drought impacted areas as well as improvements to the VD1 dump.

2.2 Rehabilitation Schedule

Over the next three years Rehabilitation activities will focus on the Saddlers Dump, Drayton Void as well as the visual dumps, especially around Denman Road area. In addition there is forecast rehabilitation of the Main Dam and North Cut tailings dam in the north of the operation. This area is dependent on the development of a safe crust on the tailings to commence the project.

The estimated schedule for existing rehabilitation maintenance and ongoing improvement works are detailed and tracked in the Mt Arthur Annual Environmental Management Review. Although all these activities are planned to be completed, they are dependent on weather and completion of emplacements to be ready for rehabilitation and therefore should be used as a guide. Actual rehabilitation is provided in the Annual Review

All studies, stakeholder consultation and final landform details are presented in the RMP.

2.3 Subsidence Remediation for Underground Operations

Although MAC is located within the Muswellbrook Mine Subsidence district, there is no recent history of mine subsidence within MAC mine leases. As a result, subsidence is not predicted to impact on mining or rehabilitation activities.

2.4 Temporary Stabilisation

Temporary stabilisation activities include the aerial seeding of long-term overburden emplacement areas for dust-suppression purposes.

Emplacement surfaces targeted as part of the aerial seeding program are those most susceptible to prevailing winds, and not available for final rehabilitation in the short to medium term. A pasture seed and fertiliser mix is aerially applied to the targeted emplacement surfaces. Dump faces that are planned to be exposed for greater than 12 months are eligible to be seeded. Areas previously seeded will be inspected to determine if additional cover is required.

An alternative temporary stabilisation option is being investigated for new rehabilitation.

3 Plan 2 – Mining and Rehabilitation 3 Yearly Forecast

The following figures show the progression of mining and rehabilitation for MAC for the period FY22, FY23 and FY24. Mining, overburden emplacement and infrastructure areas may be brought forward from any year during the Forward Program period, dependant on mine schedule requirements. Actual disturbance and rehabilitation is reported annually in the Annual Environmental Management Review.

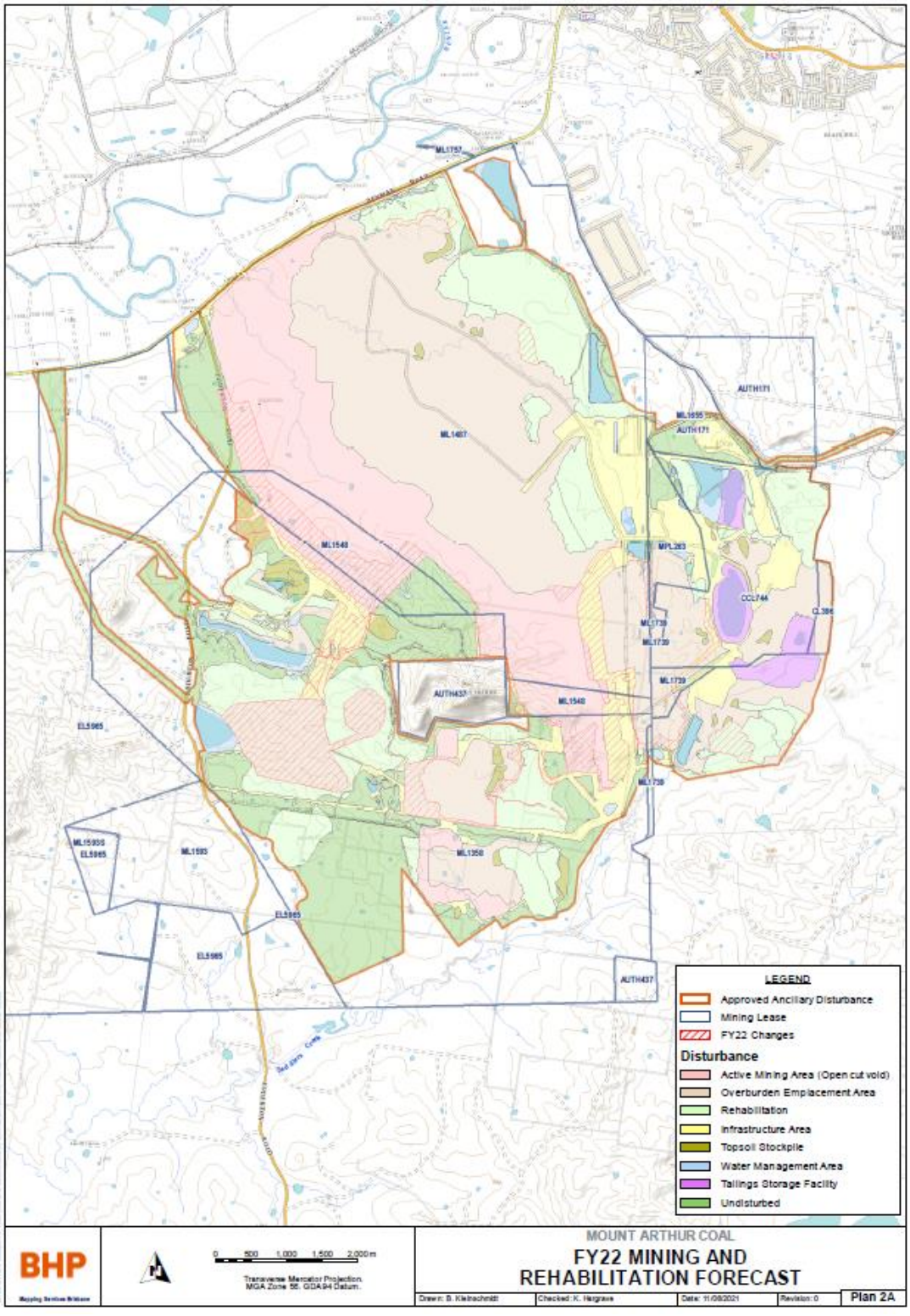


Figure 2. Plan 2A – Indicative FY22 Mining and Rehabilitation

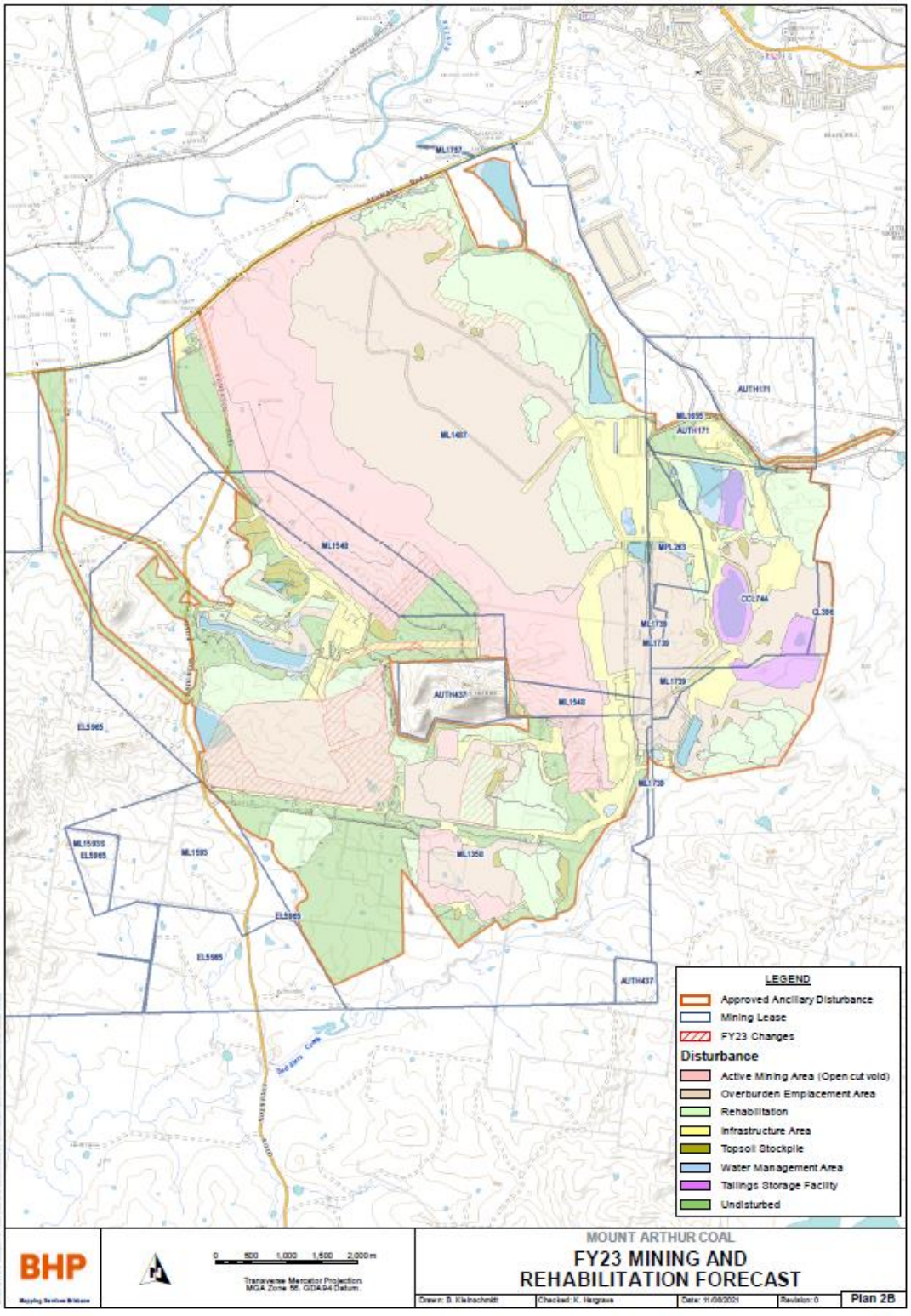


Figure 3. Plan 2B – Indicative FY23 Mining and Rehabilitation

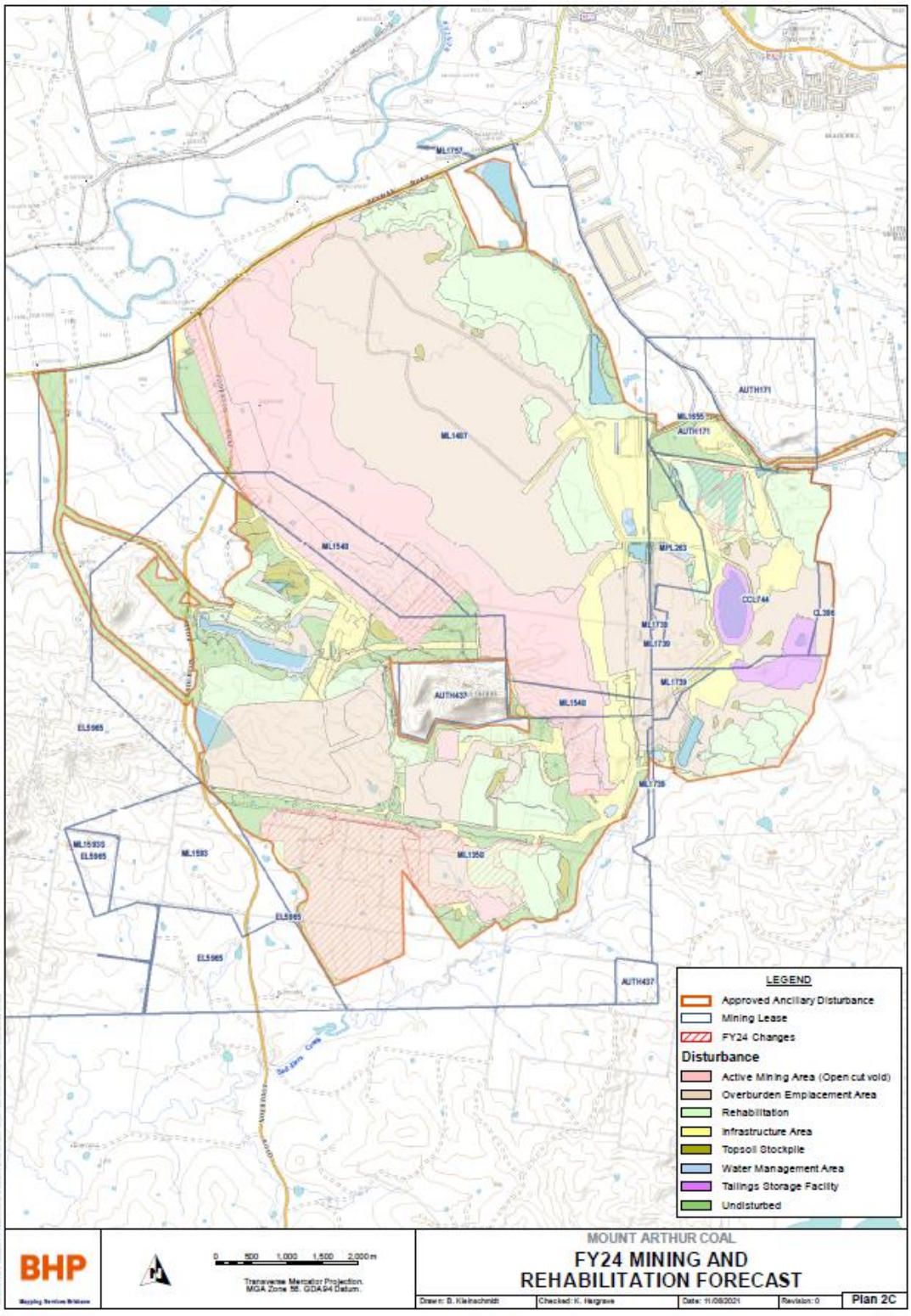


Figure 4. Plan 2C – Indicative FY24 Mining and Rehabilitation

4 Progressive Mining and Rehabilitation Statistics

4.1 Three Yearly Forecast Cumulative Disturbance and Rehabilitation Progression

During this AFP period, MAC will continue to undertake progressive rehabilitation of the site. This will include the reshaping and seeding of 223 ha. Disturbance and rehabilitation progression during the three year term is presented in Table 2. Mining, overburden emplacement and infrastructure areas may be brought forward from any year during the Forward Program period, dependant on mine schedule requirements. Actual disturbance and rehabilitation is reported annually in the Annual Environmental Management Review.

Table 2: Predicted cumulative disturbance and rehabilitation progression during the next 3-year term

Year	Total Disturbance Footprint - Surface Disturbance (ha)	Underground mining area (ha)	Total Active Disturbance (ha)	Rehabilitation Land Preparation (ha)	Ecosystem & Land Use Establishment (ha)
End FY22 (30 Jun 2022)	5589	0	4506	43	43
End FY23 (30 Jun 2023)	5702	0	4643	69	69
End AFP (30 Jun 2024)	6060	0	4960	96	96

4.2 Rehabilitation Key Performance Indicators

The rehabilitation to disturbance ration is presented in Table 3. Rehabilitation over the Forward Program period will be focused in the northern section of the site in the Visual Dumps, Drayton Void and Saddlers.

Table 3: Progressive rehabilitation key performance indicators during the 3 year term

Year	Total New Active Disturbance Area (annual)	Area of Land Proposed for Active Rehabilitation (annual)	Rehabilitation to Disturbance Ratio (annual)
End FY 22 (30 Jun 2022)	346	43	0.12
End FY23 (30 Jun 2023)	208	69	0.33
End AFP (30 Jun 2024)	414	96	0.23

Appendix 1: Document Control Authorisation

Business Process Owner Endorser Authorisation			
Position	**Name**	**Date**	**Signature**
Manager HSE	Hannah Farr	9/7/21	
Manager Technical Services	Damien Williams	9/7/21	D.williams
Superintendent Midterm Planning	Emma White	9/7/21	

Approver Authorisation			
Position	**Name**	**Date**	**Signature**
General Manager	Adam Lancey	15/07/2021	

Amendment History			
Date	**Version**	**Page**	**Details**
May 2017	1.0	All	New two year MOP for FY18 and FY19
November 2017	1.1	13, 17, 43, 49, 108	Amendment to include Conveyor corridor dump, Saddlers Mining and Ayredale infrastructure. MOP Plans 3A – E and Plan 4 have been updated.
August 2018	1.2	1, 8, 9, 18, 44, 46, 50, 109	Amendment to include dump area at Saddlers, conveyor corridor and sublease. Also to include mining in Saddlers, Ayredale and Roxburgh
June 2019	2.0	All	Format change following Annual Forward Program Guideline FY 20-22
December 2019	2.1		Dewatering of tailings trial addition
May 2020	3.0	All	Update to mine plans. Minor text additions. Tailings information added in response to Targeted Tailings Assessment by the resources regulator.
June 2021	4.0	All	Update to mine plans. Minor text changes.

Appendix 2: References

Reference	Publication
Grigg et al	Grigg, A., Emmerton, B.R. and McCallum, N.J. ACARP Project C8038: Completion Criteria for Pasture Based Rehabilitation in the Bowen Basin. CMLR, University of Queensland. August 2001.
Rawlings et al	Rawlings, K.; Freudenberger, D.; and Carr, D.; A Guide to Managing Box Gum Grassy Woodlands. Department of the Environment, Water, Heritage and the Arts, 2010.
2009 EA	Hansen Bailey (2009) Mt Arthur Coal Consolidation Project Environmental Assessment
2013 EA	Resource Strategies (2013) Mt Arthur Coal Open Cut Modification Environmental Assessment
Blue Book Vol 2E	Managing Urban Stormwater Guidelines: Volume 2E Mines and Quarries. NSW EPA, 2008.
PA 09_0062 MOD 1	Project Approval 09_0062 MOD 1. Mt Arthur Coal Mine – Open Cut Modification Project, NSW Department of Planning and Environment, September 2014.
EPBC	Environmental Protection and Biodiversity Conservation Act Approval 2011/5866. Department of Sustainability, Environment, Water, Population and Communities, April 2012.
BMP/OMP	Biodiversity Management Plan and Offset Management Program for Onsite and Near site Offset Areas. In prep. Umwelt, 2013.
Closure Plan	Mt Arthur Coal Mine, Hunter Valley, NSW. Development of a Conceptual Mine Closure Plan and Outline of the Methodology behind the Closure Cost Provision and Valuation. GSSE, July 2011.
EMS	Mt Arthur Coal Environmental Management System
EPL	Environment Protection Licence No. 11457
DSC	NSW Dam Safety Committee approval conditions
SWMP	Surface Water Management Plan
Dump Standard	Standard for Design, Construction and Maintenance of Dump Areas
Agronomist	Report prepared by consulting agronomist on grazing potential on Mt Arthur Coal pasture rehabilitation. In preparation.
Elliot & Veness	After Elliot, G.L. and Veness, R.A. Selection of Topdressing Material for Rehabilitation of Disturbed Areas in the Hunter Valley. J.Soil Cons, NSW 37 37-40, 1981.
Hazelton & Murphy	Hazelton, P.A. & Murphy, B.W. Interpreting Soil Test Results: What do all the numbers mean? (2nd ed.). CSIRO, 2007.

BHP

Rehabilitation Management Plan Mt Arthur Coal

21 June 2021

Mt Arthur Lease Block

Mt Arthur Coal Lease Block	
Name of Mine	Mt Arthur Coal
Rehabilitation management Plan Commencement Date	1 September 2021
Rehabilitation management Plan Completion Date	N/A
Mining Authorisations (Lease/License No.):	CCL 744, CL 396, ML 1358, ML 1487, ML 1548, ML 1593, ML 1655, MPL 263, A 171, A 437 , EL 5965, Sublease CL 229, ML1757, ML1739, Sublease CL 395
Name of Authorisation / lease Holder	Hunter Valley Energy Coal Pty Ltd Mt Arthur Coal Pty Limited
Name of Mine Operator:	Mt Arthur Coal Pty Limited
Name and Contact Details of the Manager (or equivalent):	Adam Lancey, General Manager Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Ph: 02 6544 5566 Email: Adam.Lancey@BHP.com
Name and Contact Details of Environmental Representative:	Hannah Farr, Manager HSE, Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Email: Hannah.j.farr@BHP.com
The information provided in this document is true and correct.	
Title:	General Manager Mt Arthur Coal
Signature:	Adam Lancey
Date:	28/07/21
Version – 3.0	Rehabilitation Management Plan

Document Developer – Environment Specialist - Business Partnership
Document Owner – Superintendent HSE Business Partnership
Document Approver – General Manager
Document Authorisation is located in Appendix 1.

Table of Contents

Figures

Tables

1. General

The Rehabilitation Management Plan (RMP) satisfies the requirement for condition 44 of the Project Approval as required by the Department of Planning, Industry and Environment (DPIE). The RMP also satisfies the Code of Practice RMP for Large Mines to management of mining and rehabilitation activities across the life of a mine. The overall regulatory objective for mine rehabilitation is to achieve progressive rehabilitation that will sustain final land use outcomes. The RMP provides a process of measurable criteria that demonstrates rehabilitation objectives are achievable and realistic within a given timeframe.

1.1 Application

This Plan applies to the following:

- All BHP employees and contract staff;
- All Partnering contractor company representatives; and
- All Subcontractor company representatives.

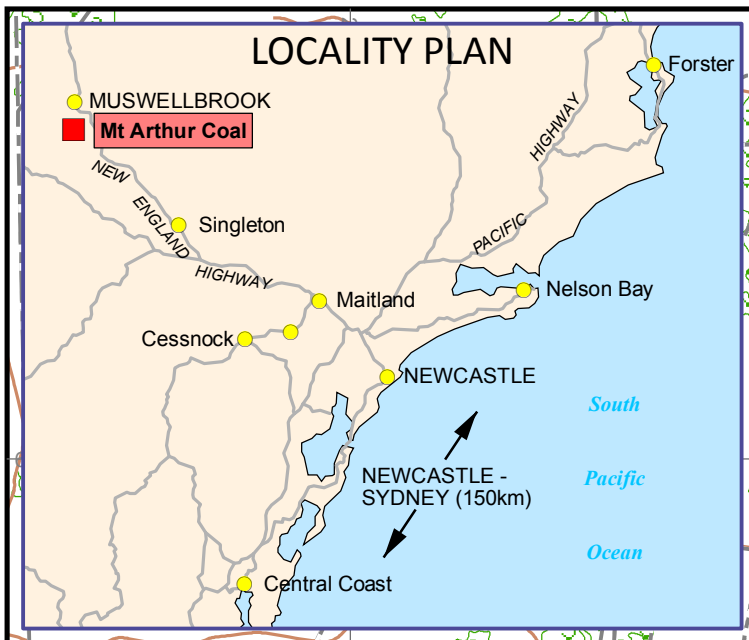
1.2 Abbreviations

AFP	Annual Forward Program
AHMP	Aboriginal Heritage Management Plan
BCD	Department of Planning, Industry and Environment: Biodiversity and Conservation Division
BCM	Bank cubic metres
BIOMP	Biodiversity Management Plan
BRMP	Biodiversity and Rehabilitation Management Plan
CCC	Community Consultative Committee
CCL	Consolidated coal lease
CHBI	Central Hunter Box – Ironbark Woodland
CHISG	Central Hunter Ironbark – Spotted Gum Grey-Gum Box Forest
CHPP	Coal handling preparation plant
CL	Coal lease
DoEE	Federal Department of the Environment and Energy
DPIE	NSW Department of Planning, Industry and Environment
DPIE ESS	Environment, Energy and Science (EES) Group (division of DPIE)
DPIE RR	Resources Regulator (division of DPIE)
DSC	NSW Dam Safety Committee approval conditions
EA	Environmental assessment
EL	Exploration licence
EPA	NSW Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPBC	Environment Protection and Biodiversity Conservation
EPL	Environment Protection Licence
EMS	Environmental management system
FLDP	Future Landscapes Design Project
FY	Financial year
HA	Hectares
HFRG	Hunter Floodplain Red Gum Woodland Complex
HRSTS	Hunter River Salinity Trading Scheme
HSE	Health, Safety and Environment
HVEC	Hunter valley Energy Coal (MT Arthur Coal)
ISO	International Standards Organisation
ITP	Inspection and test plan
LGA	Local government area
MAC	Mt Arthur Coal

MACT	Mt Arthur Coal Terminal
MAC GPA	Mt Arthur Coal Ground Pasture Assessment
ML	Mining lease
MOP	Mining Operations Plan
MPL	Mining purpose lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NFSB	Narrabeen Footslopes Slaty Box Woodland
NGER	National Greenhouse and Energy Reporting Act 2007
NGO	Non-government organisation
NOW	Former NSW Office of Water
NRAR	Natural Resources Access Regulator
NSW	New South Wales
OEH	Former NSW Office of Environment and Heritage
PIRMP	Pollution Incident Response Management Procedure
ROM	Run of mine
RAP	Remedial Action Plan
UHWB	Upper Hunter White Box – Ironbark Grassy Woodland

1.3 Definitions

- **Hunter Valley Energy Coal Pty Ltd -** operates the Mt Arthur Coal Complex which consists of the approved open cut mining operations, a rail loop and associated rail loading facilities (PA 09_0062) and the Mt Arthur Underground Project (PA 06_0091).
- **Future Landscapes Design Project -** The FLDP was a project undertaken to research a landform approach that would align with community expectations and improvements in landform design techniques. A report by Landloch Pty Ltd (2014) was written to capture the findings of the project which have now been incorporated into the Applied Geofluvial landform.
- **Geomorphic Landform Design -** The Adaption of the Geofluvial approach used at Mt Arthur Coal, uses the characteristics of stable natural alluvial landforms as an analogue on which to base the design of mine overburden landforms. Importantly, the approach does not replicate existing landforms, but rather uses the key characteristics that make these landforms stable in the design.
- **The Project Approval -** Project Approval 09_0062 MOD 1 Mt Arthur Coal Mine – Open Cut Modification Project dated 26 September 2014.
- **Annual Forward Program (AFP)** – The Annual Forward Program meets the requirements of a Mining Operations Plan (MOP) as required by Mt Arthur Coals various Mining and Coal Leases.
- **Rehabilitation Management Plan (RMP) -** The Rehabilitation Management Plan meets the requirements of Condition 44 of the Mt Arthur Coal Modification Project PA 09_0062 MOD 1 under Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act). Condition 44 requires the project proponent to prepare and implement a Rehabilitation Management Plan for the Project.
- **Approval Objective** – The objective of the mine closure process developed in Mt Arthur Coal Mine – Open Cut Modification Project (PA 09_0062 MOD 1).
- **Closure Objective** – More detailed objectives designed to facilitate the alignment of Approval Objectives and detailed SMART Closure Criteria.



Muswellbrook LGA

Singleton LGA

Muswellbrook

Wybong Road

Roxburgh Road

Bengalla Link Road

Main Northern Railway

Denman Road

HUNTER RIVER

Thomas Mitchell Drive

Ramrod Creek

NEW ENGLAND HIGHWAY

Muscle Creek

Antiene Rail Spur

Edderton Road

Saltwater Creek

Saddlers Creek

GOLDEN HIGHWAY

Plashett Reservoir

ML1487

ML1655

A171

EL5965

ML1358

ML1548

MPL 263

CCL744

ML1793

CL396

SUBLEASE CL395

A437

SUBLEASE CL229

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LEGEND

- Project Approval Boundary
- Extraction Limit
- Mt Arthur Coal Mining Tenements
- Other Mining Tenements
- Local Government Authority
- Railway
- Watercourse
- Natural Woodland
- Urban Area

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Geospatial Team
Brisbane

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Transverse Mercator Projection.
MGA Zone 56. GDA84 Datum.

MT ARTHUR

MINING OPERATIONS PLAN

Pre-Mining Environment - Project Locality

Drawn: P. Watts	Checked: L. Neil	Date: 20/07/2021	Revision: 01	Filename: MOP Plan 1A	PLAN 1A

2. Introduction to Mining Project

Hunter Valley Energy Coal Pty Ltd (HVEC) operates Mt Arthur Coal, which consists of an approved open cut and underground mining operation, a rail loop and associated rail loading facilities. The Mt Arthur Coal Mine is located approximately 5 kilometres south west of Muswellbrook within the Muswellbrook Shire Local Government Area (LGA) in the Upper Hunter Valley of NSW. The location of Mt Arthur Coal is shown in **Figure 1**.

This RMP meets the requirements of Condition 44 of the Mt Arthur Coal Modification Project PA 09_0062 MOD 1 under Section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act). Condition 44 requires the project proponent to prepare and implement a Rehabilitation Management Plan for the Project.

2.1 History of Operations

Coal mine development at Mt Arthur Coal commenced in the early 1960s in the Bayswater No. 2 Open Cut mining area. Coal production progressively increased and approval to extract coal from the Bayswater No. 3 Open Cut was granted in 1994. To support the expanding development at Bayswater No. 3 and cease coal transport by public road, approval was obtained in November 2000 for the construction and operation of the rail loading facility and spur line. This allows export coal to be transported directly to Newcastle via the Main Northern Railway.

In May 2001, the Mt Arthur North Open Cut operation was approved to extract up to 15 million tonnes of run-of-mine (ROM) coal per annum. The approval also allowed for the construction and use of associated infrastructure and facilities.

Between 2003 and 2006, Saddlers Pit (located in the southern portion of the mine lease area) was maintained on a care and maintenance regime, when mining operations at Bayswater No 3 were effectively suspended. The majority of the work undertaken during the following period involved reshaping and final rehabilitation of several hundred hectares in the vicinity of the Bayswater No 3 open cut operations.

In March 2006, Mt Arthur Coal lodged an application to extend the Mt Arthur North South Pit. The application was approved by the Minister for Planning on 9 January 2008. In September 2006 mining resumed in Saddlers Pit, with overburden removal initially being undertaken by contract miners and coal extraction by Mt Arthur Coal. Mt Arthur Coal assumed responsibility for overburden removal in March 2012.

Also in March 2006, Mt Arthur Coal lodged an application to commence underground mining operations at Mt Arthur Coal Mine. The application was approved by the Minister for Planning on 2 December 2008 (Project Approval 06_0091). The Mt Arthur Underground Project is approved up to 8 million tonnes per annum (Mtpa). Saddlers Pit was utilised for construction of an underground adit associated with that project. The underground project is currently on care and maintenance.

In 2009, Mt Arthur Coal lodged an application under Part 3A of the New South Wales Environment Planning and Assessment Act, 1979 (EP&A Act) to extend open cut operations and consolidate existing approvals for open cut mining operations and surface infrastructure. The application was approved by the Minister for Planning on 24 September 2010 (Project Approval 09_0062). The Project Approval 09_0062 permitted the extraction of up to 32 Mtpa of ROM coal from the open cut.

In accordance with Project Approval 09_0062, a number of project approvals were surrendered by Mt Arthur Coal in 2011 including Mt Arthur North, the Rail Loading Facility and the South Pit Extension and the Bayswater Coal Preparation Plant. The surrender of the Bayswater No. 3 development consent (210/93) was accepted by the Department of Planning & Environment (now DPIE) on 20 May 2013.

In 2013, Mt Arthur Coal lodged an application to modify the Project Approval 09_0062 under section 75W of the EP&A Act (the Mt Arthur Coal Open Cut Modification [the Modification]). The application was approved by the Planning Assessment Commission (as delegate of the Minister for Planning) on 26 September 2014 (Project Approval 09_0062 MOD 1). The Modification includes the continuation of open cut mining operations at the Mt Arthur Coal Mine for an additional operational life of four years from 2022 to 2026 at the maximum rate of 32 Mtpa, an increase in open cut disturbance areas, additional overburden emplacement areas, duplication of the existing rail loop and various additional infrastructure changes. The Modification Project Approval can be found at http://www.bhpbilliton.com/environment/regulatory-information.

On 2 December 2016, EPBC approval 2014/7377 was granted for the Modification project, aligning the date with the modification approval life to 2026.

2.2 Current Consents, Leases and Licences

Under the mining lease conditions, the lease holder must have the following components of the Rehabilitation Management Plan approved by the Minister: the Rehabilitation Objectives and Completion Criteria (Part 5); and, the Final Landform and Rehabilitation Plan (Part 6). The remaining components of the Rehabilitation Management Plan do not require approval but must still be provided as they comprise essential context for assessing the Rehabilitation Objectives and Completion Criteria, and the Final Landform and Rehabilitation Plan. The remaining components must be prepared to the satisfaction of the Minister.

Details on Mt Arthur Coal's existing statutory approvals as at May 2021 are provided in **Table 1**.

The Modification Project includes the following key components:

- a four year continuation of the open cut mine life from 2022 to 2026 at the currently approved maximum rate of 32 Mtpa;
- an increase in open cut disturbance areas;
- use of the existing conveyor corridor between Mt Arthur Coal and Maxwell Infrastructure for overburden emplacement;
- duplication of the existing rail loop;
- an increase in the maximum number of train movements per day from 24 to 30;
- the relocation of the load point for the overland conveyor which delivers coal to Macquarie Generation's Bayswater Power Station;
- the relocation and upgrade of the explosives storage, magazine and associated facilities; and
- the construction of additional offices, a control room and a small extension to the ROM coal stockpile footprint.

2.2.1 Mining Tenements

Mt Arthur Coal currently holds 14 mining and exploration leases and licences including two subleases (Maxwell Infrastructure (formerly Drayton) subleases CL 395 and CL 229). Mining tenement details are provided in **Table 1** and **Figure 2**.

2.2.2 Environment Protection Licence

Mt Arthur Coal currently holds one Environment Protection Licence (EPL), EPL No. 11457, for the following scheduled activities:

- Chemical Storage, 5 to 100 tonnes generated or stored;
- Coal Works, > 500,000 tonnes handled; and
- Mining for Coal, > 5,000,000 tonnes produced.

2.2.3 Environment Protection and Biodiversity Conservation Approval

On 30 April 2012 Department of Environment (DoE) granted Mt Arthur Coal conditional approval EPBC 2011/5866 to undertake a controlled action (development of five new open cut extension areas) within the designated areas. The controlled action was commenced on 21 May 2012, with approximately one hectare of vegetation cleared for the construction of a dual substation facility. The EPBC referral for the Modification project was lodged in late 2014 and was determined a Controlled Action in 2015. On the 2 December 2016, EPBC approval 2014/7377 was granted for the Modification project.

Table 1 Mt Arthur Coal's existing statutory approvals as at May 2021

Description	Issue date	Expiry date
Development consents or project approvals issued by the DPIE		
Mt Arthur Coal Mine – Open Cut Modification Project (PA 09_0062 MOD 1)	26/09/2014	30/06/2026
Mt Arthur Coal Mine – Underground Project	02/12/2008	31/12/2030
Mining leases and exploration licences issued by the Resources Regulator		
CCL 744	03/07/1989	21/01/2028
CL 396	23/06/1992	03/02/2024
ML 1358	21/09/1994	21/09/2036
ML 1487	13/06/2001	12/06/2022
ML 1548	31/05/2004	30/05/2025
ML 1593	30/04/2007	29/04/2028
ML 1655	03/03/2011	03/03/2032
MPL 263	17/10/1990	17/10/2032
A 171	18/10/1979	25/11/2020
A 437	04/03/1991	04/03/2020
EL 5965	15/07/2002	14/07/2017
ML1739	25/07/2016	25/07/2037
ML 1757	7/07/2017	7/07/2038
CL 229	03/02/1982	02/02/2024
CL 395	23/06/1992	21/01/2029
EPL issued by the EPA		
EPL 11457	09/10/2001 (last updated on 1/03/2021)	Not specified
EPBC approval issued by the DoE		
EPBC 2011/5866	30/04/2012	30/06/2026
EPBC 2014/7377	05/12/2016	30/06/2026

For the purposes of this RMP, the Mt Arthur Coal Mine is considered to be classified as a Level 1 mine (in accordance with the RMP guidelines) due to the project being a large coal mine that was previously approved (PA 09_0062) under Part 3A of the EP&A Act.

BHP

Spatial Data Team
Brisbane

Scale 1:50,000 @ A3

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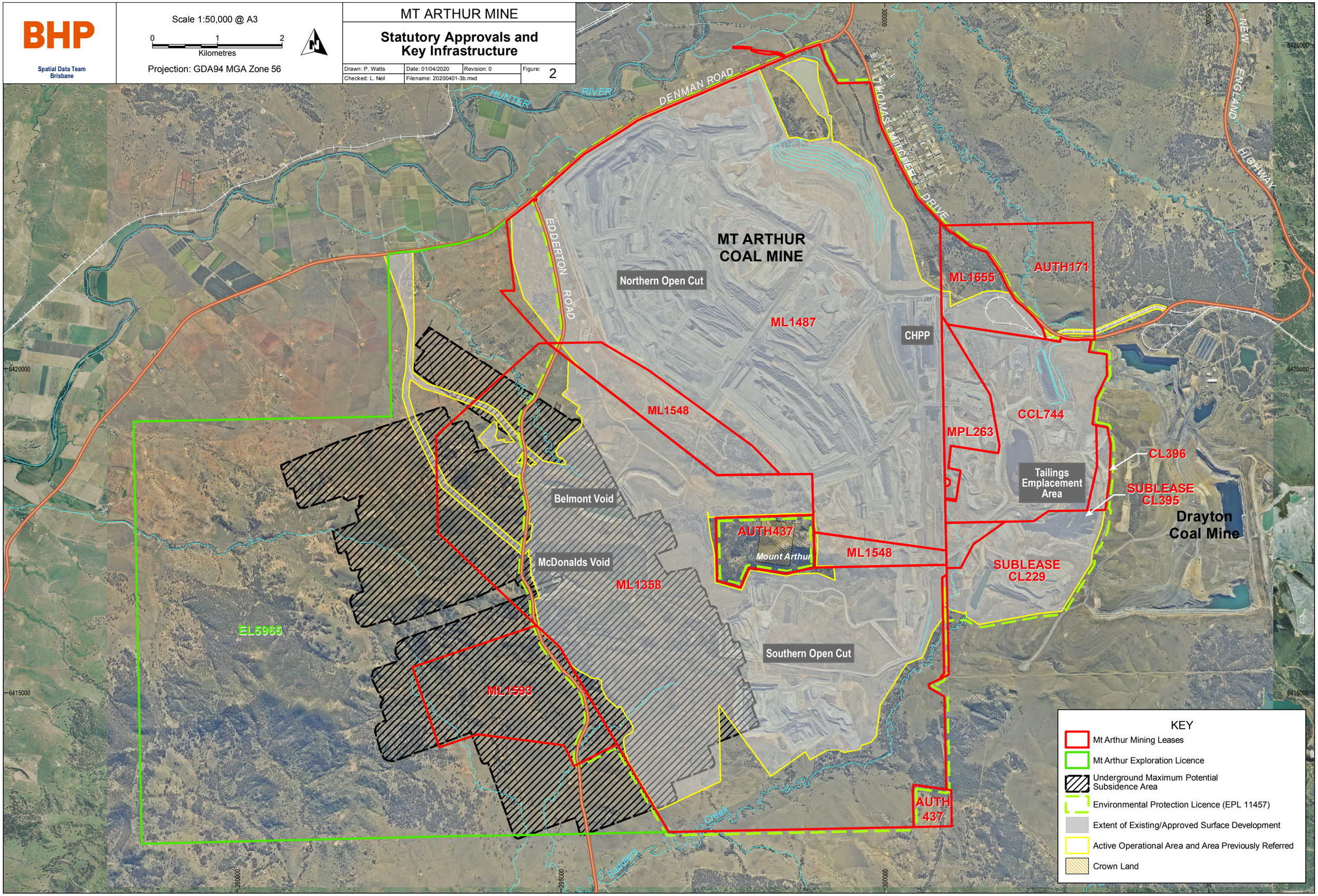
Kilometres

Projection: GDA94 MGA Zone 56

MT ARTHUR MINE

Statutory Approvals and Key Infrastructure

Drawn: P. Watts	Date: 01/04/2020	Revision: 0	Figure: 2
Checked: L. Neil	Filename: 20200401-3b.mxd		



KEY

- Mt Arthur Mining Leases
- Mt Arthur Exploration Licence
- Underground Maximum Potential Subsidence Area
- Environmental Protection Licence (EPL 11457)
- Extent of Existing/Approved Surface Development
- Active Operational Area and Area Previously Referred
- Crown Land

2.2.4 Land Ownership and Land Use

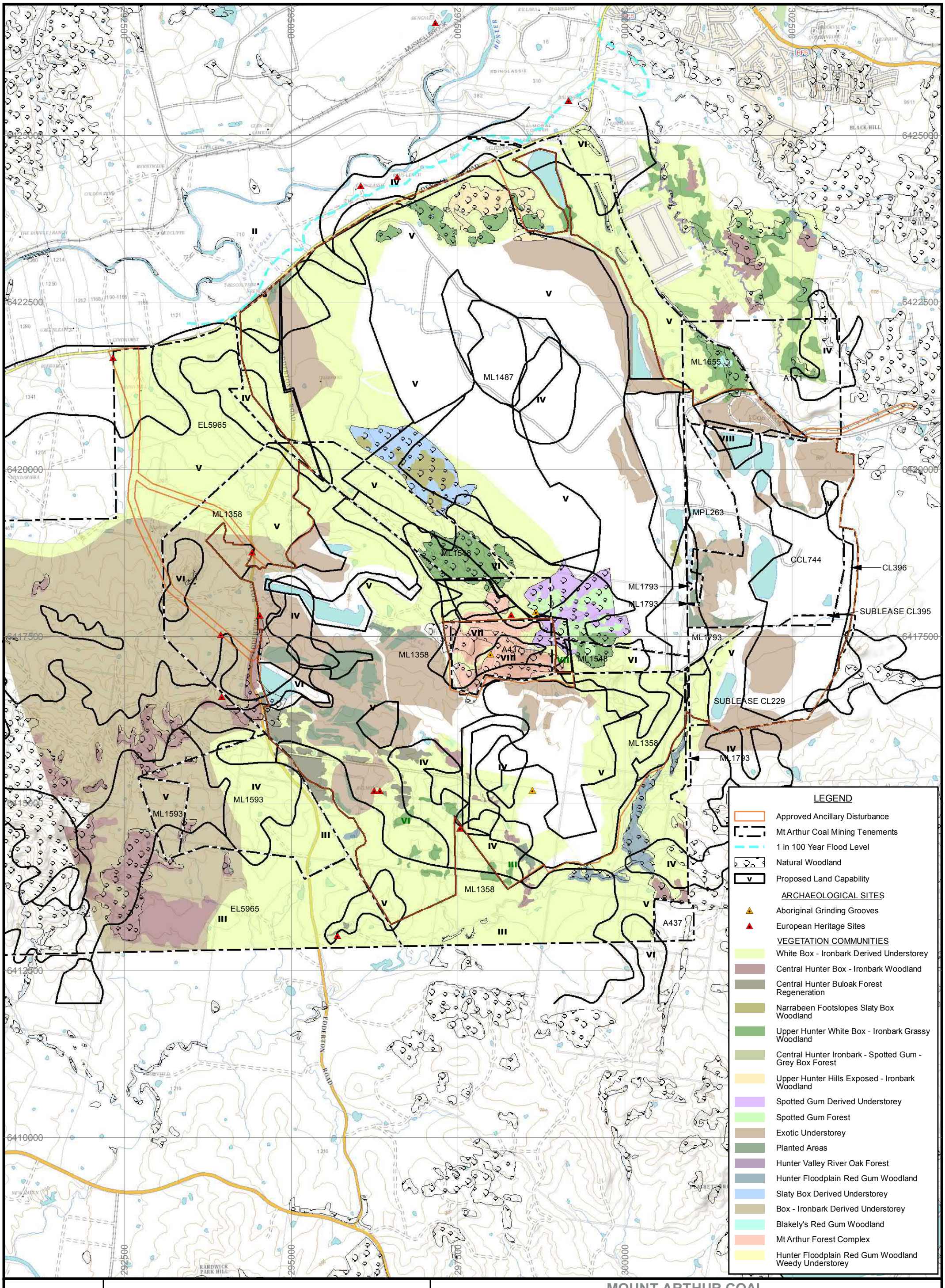
With the exception of small areas of Crown land, road reserves and private freehold property, Mt Arthur Coal and its subsidiaries own all the land within the Mt Arthur Coal mining tenements. Mt Arthur Coal also owns adjacent properties to the north-east, north and west, which are maintained as buffer land or biodiversity offset areas. With the exception of the Maxwell Infrastructure Sub-lease Area in the south east of the mine site, the operational areas at Mt Arthur Coal are located entirely within the land owned or managed by Mt Arthur Coal. A number of Crown and Council road reserves are located within the Lease areas, and these road reserves will be impacted by the proposed mining operations.

Maxwell infrastructure Pty Ltd owns the majority of land to the immediate east and south of Mt Arthur Coal mining tenements, including the Maxwell Infrastructure (Drayton) Sub-Lease Area, with land further to the south east owned by Macquarie Generation. The majority of the land owned by Anglo Coal is subject to mining tenements. The Bengalla Joint Venture owns the land on which Bengalla Mine operates and to which its mining tenements apply, to the immediate north of the Mt Arthur Coal.

The topography surrounding the Mt Arthur Coal Mine is gently undulating to hilly, dominated by Mount Arthur (482 m AHD), located within the mine operational area, and Mount Ogilvie (468 m AHD), located to the west of the Mt Arthur Coal Mine. The north of the Mt Arthur Coal Mine gently slopes up from the alluvial flats of the Hunter River at an elevation of approximately 120 m AHD, rising to approximately 230 m AHD at MacLeans Hill and becoming progressively steeper in the vicinity of Mount Arthur and Mount Ogilvie. From Mount Ogilvie, the southern portion of the Mt Arthur Coal Mine slopes down to form part of the Saddlers Creek floodplain. On-site, the Mt Arthur Coal Mine is characterised by mine landforms and infrastructure associated with current and historic mining operations.

The Mt Arthur Coal Mine is situated within the Upper Hunter region which has a long history of rural land use for a variety of agricultural and industrial activities, predominantly livestock grazing and coal mining. Mt Arthur Coal is located within lands that have been largely disturbed by previous agricultural activities, particularly cultivation and grazing. Agriculture has occurred on nearby land since the 1800s.Muswellbrook region was first inhabited by European settlers in 1824, resulting in a landscape largely dominated by grassland and scattered woody vegetation interspersed with small denser stands of remnant woodland vegetation.

The current dominant land uses within and adjacent to the existing mining lease boundaries include open cut coal mining, power generation and industrial activities, agriculture, rural residential and residential areas. Other land uses include equine industries and viticulture. Where possible, rehabilitation planning at Mt Arthur Coal Mine will attempt to maximise opportunities for a diverse post-mining landscape and range of land uses. It is proposed that final land uses will include pastoral, commercial forestry, recreation and/or wildlife habitat opportunities. Land ownership and landuse information is found in Figure 1, Figure 3 and Figure 4.



BHP

Mapping Services Brisbane

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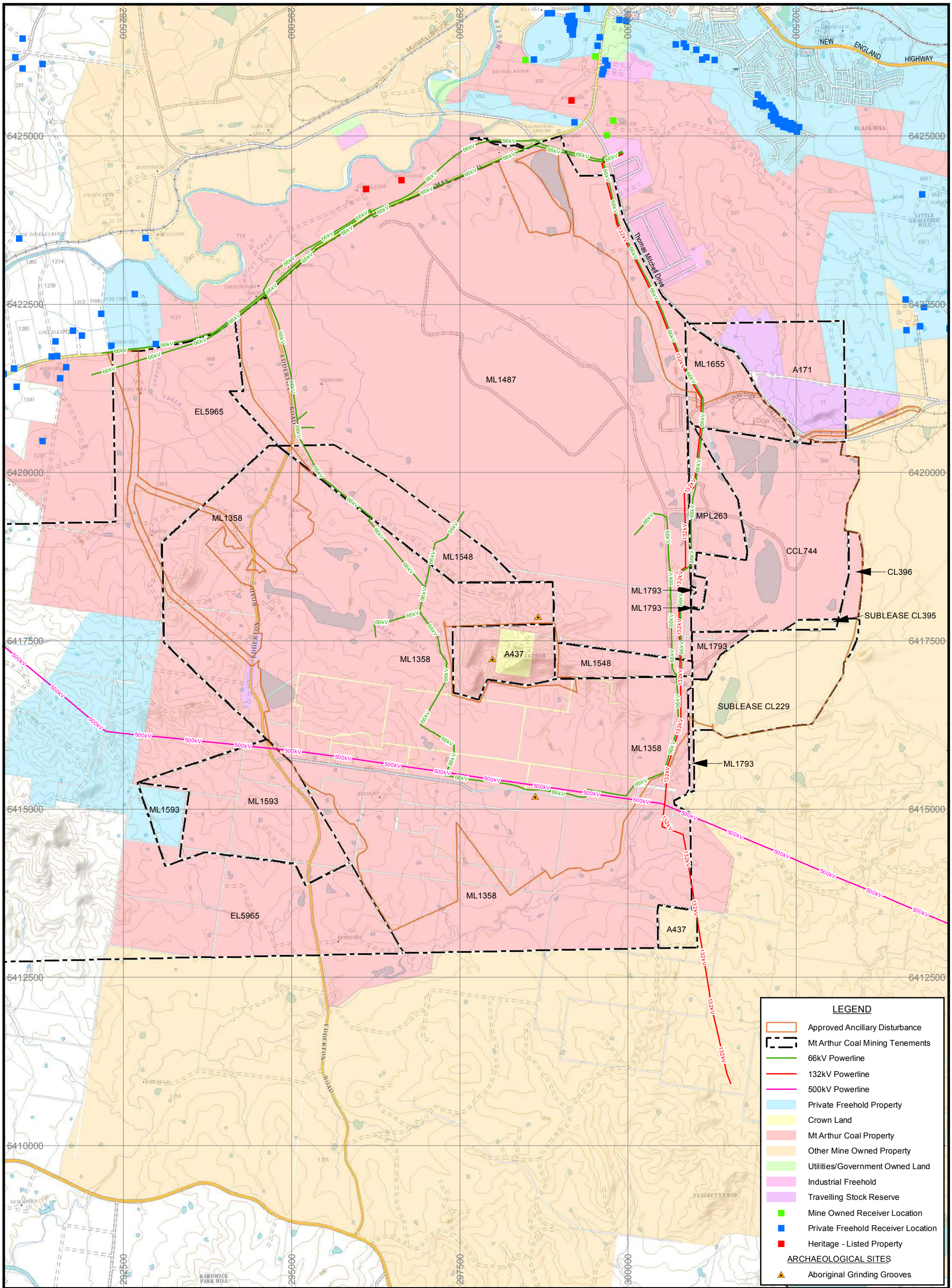
Transverse Mercator Projection.
MGA Zone 56. GDA84 Datum.

MOUNT ARTHUR COAL

Pre-Mining Environment - Natural Environment

Drawn: B. Kleinschmidt	Checked: L. Neil	Date: 15/07/2019	Revision: 0	Filename: MAC_RehabPlan_1B

Figure 3



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MGA Zone 56. GDA84 Datum.

MOUNT ARTHUR COAL

Pre-Mining Environment - Built

Drawn: B. Kleinschmidt	Checked: L. Neil	Date: 5/06/2019	Revision: 0	Filename: MAC_RehabPlan_1C

Figure 4

3. Final Land Use

3.1 Regulatory Requirements for Rehabilitation

Conditions relating to rehabilitation and progress towards the post-mining land use are contained in:

- Project Approval (09_0062 MOD 1);
- EPBC Approval 2014/7377; and
- Key Mining Tenements.

Those conditions that specifically affect the post mining land use, landscape and rehabilitation outcomes management are contained in **Table 2**.

Table 2 Regulatory Requirements Related to Rehabilitation

Document	Condition/ Section	Requirement	Summary of Status
Project Approval (09_0062 MOD 1)	Schedule 2, Condition 5	Mining operations for the project may take place until 30 June 2026.	Mining operations continuing.
	Schedule 3, Condition 36	The Proponent shall implement the biodiversity offset strategy as outlined in Table 13 and as generally described in the EA (and shown in Appendix 7), to the satisfaction of the Secretary.	The current approved Rehabilitation Strategy incorporates rehabilitation for 1915ha of woody vegetation (including 500ha of Box Gum woodland). This was revised in September 2015 to incorporate 2642ha of woody vegetation as outlined in PA 09_0062 MOD 1. The current Rehabilitation Strategy was revised and submitted to DPIE for approval in July 2020.
	Schedule 3, Condition 38	The Proponent shall ensure that the offset strategy and/or rehabilitation strategy is focused on the re-establishment of: (a) significant and/or threatened plant communities, including: • Upper Hunter White Box – Ironbark Grassy Woodland; • Central Hunter Box – Ironbark Woodland; • Central Hunter Ironbark – Spotted Gum - Grey Box Forest; • Narrabeen Footslopes Slaty Box Woodland; • Hunter Floodplain Red Gum Woodland Complex; • White Box Yellow Box Blakely's Red Gum Woodland; • Hunter Lowlands Red Gum Forest; and (b) significant and/or threatened plant species, including: • River Red Gum (*Eucalyptus camaldulensis*); • Pine Donkey Orchid (*Diuris tricolor*); • Tiger Orchid (*Cymbidium canaliculatum*); • Weeping Myall (*Acacia pendula*); and (c) habitat for significant and/or threatened animal species.	Native vegetation seed mixes and tubestock planting species composition reflects the communities mentioned in Condition 38(a). Relocation of habitat trees, have been incorporated into rehabilitation design to enhance habitat value.

Document	Condition/ Section	Requirement	Summary of Status
	Schedule 3, Condition 40	Biodiversity Management Plan The Proponent shall prepare and implement a Biodiversity Management Plan for the project to the satisfaction of the Secretary. This plan must: (a) be prepared in consultation with OEH and Council, and be submitted to the Secretary for approval by the end of March 2015, unless otherwise agreed with the Secretary; (b) describe how the implementation of the offset strategy would be integrated with the overall rehabilitation of the site (see below); (c) include: (i) a description of the short, medium, and long term measures that would be implemented to: • implement the offset strategy; and • manage the remnant vegetation and habitat on the site and in the offset areas; (ii) detailed performance and completion criteria for the implementation of the offset strategy; (iii) a detailed description of the measures that would be implemented over the next 3 years, including the procedures to be implemented for: • implementing revegetation and regeneration within the disturbance areas and offset areas, including establishment of canopy, sub-canopy (if relevant), understorey and ground strata; • protecting vegetation and soil outside the disturbance areas; • rehabilitating creeks and drainage lines that occur on the site, both inside and outside the disturbance areas (such as the White's Creek Diversion), to ensure no net loss of aquatic habitat; • managing salinity; • conserving and reusing topsoil; • undertaking pre-clearance surveys; • managing impacts on fauna;	The current Biodiversity Management Plan was revised and approved to DPIE in May 2019 and the Department of the Environment and Energy in June 2019.

<table>
<tr><th>Document</th><th>Condition/ Section</th><th>Requirement</th><th>Summary of Status</th></tr>
<tr><td></td><td></td><td>• landscaping the site and along public roads (including Thomas Mitchell Drive, Denman Road, Edderton Road and Roxburgh Road) to minimise visual and lighting impacts;
• collecting and propagating seed;
• salvaging and reusing material from the site for habitat enhancement;
• salvaging, transplanting and/or propagating threatened flora and native grassland, in accordance with the Guidelines for the Translocation of Threatened Plants in Australia (Vallee et al., 2004);
• controlling weeds and feral pests;
• managing grazing and agriculture;
• controlling access; and
• bushfire management;
(iv) a program to monitor the effectiveness of these measures, and progress against the performance and completion criteria;
(v) a description of the potential risks to successful revegetation, and a description of the contingency measures that would be implemented to mitigate these risks; and
(vi) details of who would be responsible for monitoring, reviewing, and implementing the plan.</td><td></td></tr>
<tr><td></td><td>Schedule 3, Condition 41A</td><td>The Proponent shall rehabilitate the site to the satisfaction of the DRE. The rehabilitation must comply with the objectives in Table 14, and be consistent with the rehabilitation plan shown in Appendix 7 and the final landform plan shown in Appendix 8.
Table 14: Rehabilitation Objectives
<table>
<tr><th>Feature</th><th>Objectives</th></tr>
<tr><td>Mine site (as a whole)</td><td>• Safe, stable and non-polluting
• Final landforms designed to incorporate natural microrelief and natural drainage lines to integrate with surrounding landforms</td></tr>
</table></td><td>Rehabilitation objectives are outlined in Section 4 of this RMP.
The current Rehabilitation Strategy was revised and submitted to DPIE for approval in July 2020.</td></tr>
</table>

Document	Condition/ Section	Requirement		Summary of Status

		Final voids	• Designed as long term groundwater sinks and to maximise groundwater flows across back-filled pits to the final void
			• Minimise to the greatest extent practicable:
			  ○ The size and depth of final voids
			  ○ The drainage catchment of final voids
			  ○ Any high wall instability risk
			  ○ Risk of flood interaction	

		Agricultural land	• Rehabilitate at least 33 hectares of Class II agricultural capability land in the area identified in the rehabilitation plan • Rehabilitate other areas identified for agricultural use in the rehabilitation plan to sufficient agricultural capability to support grazing	
		Revegetation areas	• Restore at least 2,642 hectares of self-sustaining woodland ecosystems in accordance with the rehabilitation plan, including at least 500 hectares of White Box Yellow Box Blakely's Red Gum Woodland	
		Creeks diversions and realignments	• Flows to mimic pre-development flows for all flood events up to and including the 1 in 100 year ARI • Incorporate erosion control measures based on vegetation and engineering revetments • Incorporate structures for aquatic habitat • Revegetate with suitable native species	
		Surface Infrastructure	• To be decommissioned and removed, unless DRE agrees otherwise	

Document	Condition/ Section	Requirement	Summary of Status
		Community: • Ensure public safety • Minimise the adverse socio-economic effects associated with mine closure	
	Schedule 3, Condition 42	The Proponent shall prepare a revised Rehabilitation Strategy for the Mt Arthur mine complex to the satisfaction of the Secretary. This strategy must: (a) be prepared in consultation with the DRE and Council, and be submitted to the Secretary for approval by the end of September 2015, unless otherwise agreed with the Secretary; (b) investigate options for: • increasing the area to be rehabilitated to woodland on the site; • reducing the size of final voids on site; and • beneficial future land use of disturbed areas, including voids; (c) describe and justify the proposed rehabilitation plan for the site, including the final landform and land use; and (d) include detailed rehabilitation objectives for the site that comply with and build on the objectives in Table 14. Note: The strategy should build on the rehabilitation plan in Appendix 7.	The current Rehabilitation Strategy was revised and submitted to DPIE for approval in July 2020.
	Schedule 3, Condition 43	The Proponent shall carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance (particularly on the face of emplacements that are visible off-site). Interim stabilisation measures must be implemented where reasonable and feasible to control dust emissions in disturbed areas that are not active and which are not ready for final rehabilitation. Note: It is accepted that parts of the site that are progressively rehabilitated may be subject to further disturbance in future.	Rehabilitation is being carried out progressively, as detailed in Section 7 of this RMP. Completion of the rehabilitation and temporary stabilisation activities proposed are understood to demonstrate compliance with Condition 43(b).
	Schedule 3, Condition 44	The Proponent shall prepare and implement a Rehabilitation Management Plan for the Mt Arthur mine complex to the satisfaction of the DRE. This plan must:	DRG confirmed in a letter dated 15 September 2015 that the Mining Operations Plan, developed in accordance with the Department's MOP Guidelines, was acceptable to satisfy the

Document	Condition/ Section	Requirement	Summary of Status
		• be submitted to NSW Trade & Investment for approval by 30 September 2015; • be prepared in consultation with the Department, NOW, OEH and Council; • be prepared in accordance with relevant NSW Trade & Investment guidelines; • describe how the rehabilitation of the site would be integrated with the implementation of the biodiversity offset strategy; • include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and triggering remedial action (if necessary); • describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval, and address all aspects of rehabilitation including mine closure, final landform including final voids, and final land use; • include interim rehabilitation where necessary to minimise the area exposed for dust generation; • include a research program that seeks to improve the understanding and application of rehabilitation techniques and methods in the Hunter Valley; • 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 • build to the maximum extent practicable on other management plans required under this approval.	requirements for a Rehabilitation Management Plan under Schedule 3 Condition 44 of the Mt Arthur Coal Modification Project Approval (PA 09_0062 MOD 1). This RMP complies with the new RMP for large Mines guidelines from the Resource Regulator (previously DRE).
EPBC Approval 2011/5688,	Condition 4	The person taking the action must commence progressive regeneration of 1915 ha of woodland and forest communities, including 299.20 ha of Box Gum Woodland identified in Table 1, as described in the Preliminary Documentation within 1 year of commencement of construction. (Table 1 indicates	Progressive regeneration of woodland and forest communities at Mt Arthur Coal commenced in the mid-1990s. The current approved Rehabilitation Strategy incorporates rehabilitation for 1915ha of woody vegetation (including 500ha of Box Gum woodland). This was revised in September 2015

Document	Condition/ Section	Requirement	Summary of Status
		500 ha of Box Gum Woodland, and 1415 ha Rehabilitation Corridors).	to incorporate 2642ha of woody vegetation as outlined in PA 09_0062 MOD 1. The current Rehabilitation Strategy was revised and submitted to DPIE for approval in July 2020.
	Condition 5	Biodiversity Management Plan The person taking the action must submit for the Ministers approval the Biodiversity Management Plan (BIOMP) for the project by 30 June 2013. The BIOMP must reflect the proposed Mt Arthur Coal Complex Biodiversity Offset Strategy as outlined in Table 1 and as generally described in the Preliminary Documentation and focus on the reestablishment and protection of a minimum of 707.7 ha of Box Gum Woodland and a minimum of 738.7 ha of suitable habitat for Regent Honeyeater and Swift Parrot. The approved BIOMP must be implemented.	The BIOMP was submitted to Mr Shane Gaddes, Assistant Secretary of the Compliance and Enforcement Branch, Environment Assessment and Compliance Division of the Department of Sustainability, Environment, Water, Population and Communities on the 28th of June 2013. The current Biodiversity Management Plan was approved by DPIE in May 2019 and the Department of the Environment and Energy in June 2019.
	Condition 7	The BIOMP must include, but not be limited to, the following information: a. a text description and map to clearly define the location, boundaries and size of the conservation and offset areas and the regeneration area and rehabilitation corridors. This must be accompanied with the offset attributes and a shape file; b. details of the mechanisms, legal instrument, steps and timing for registering a legally binding conservation covenant that provides enduring protection over each nominated conservation and offset area; c. a detailed description of the current condition of the extant vegetation of each conservation and offset area prior to any management activities. This will provide a baseline description of the vegetation condition for the purpose of monitoring; d. details of vegetation communities to be re-established to achieve the 500 ha regeneration area and 1415 ha of rehabilitated corridors: i. timing of progressive regeneration;	The current Biodiversity Management Plan was approved by DPIE in May 2019 and the Department of the Environment and Energy in June 2019.

Document	Condition/ Section	Requirement	Summary of Status
		ii. criteria to determine success of re-establishment of the Box Gum Woodland and other woodland and forest communities iii. documentation including mapping of current environmental values relevant to MNES of the area; iv. where revegetation through planting seedlings and/or seeds is intended details of appropriate species and ratios of species relevant to historically occurring listed migratory and listed threatened species habitat and the White Box Yellow Box Blakelys Red Gum Grassy Woodland and Derived Native Grassland Ecological Community; and the source and provenance of the seed and/or seedlings which will be used. e. details of measures to offset the impacts to the MNES described in conditions 3 and 4 including details of management actions that will improve the condition of a minimum of 707.7 ha within the conservation and offset areas and 299.2 ha regeneration area to state 1 consistent with the state and transition model for Box Gum Woodland (Rawlings et al, 2010) and listing advice for the White Box Yellow Box Blakelys Red Gum Grassy Woodland and Derived Native Grassland Ecological Community; ii. management schedules for all conservation and offset areas, the regeneration area and the rehabilitation corridors identifying targeted actions for specific areas to protect and enhance the extent and condition of habitat values of the offset areas, a map showing areas to be managed; iii. type of actions for each conservation and offset area, the regeneration area and rehabilitation corridors and details of methods to be used; iv. timing of management actions for each area; v. performance criteria for each action; vi. a detailed monitoring plan for each action including, but not limited to, control sites, periodic ecological surveys to be undertaken by a qualified ecologist, as agreed to in writing by the Minister, and consistent with survey guidelines for	

Document	Condition/ Section	Requirement	Summary of Status
		nationally threatened species and communities, to assess the success of the management actions measured against identified milestones and objectives; vii. contingency measures to be implemented if performance criteria are not met; viii. a process to report, to the Department, the progress of management actions undertaken in the conservation and offset areas, regeneration area and rehabilitation corridors and the outcome of those actions, including identifying any need for improved management and actions to undertake such improvement; and ix. details of the various parties responsible for management, monitoring and implementing the management activities, including their position or status as a separate contractor.	
Mining Tenement ML1358			No directives consistent with Conditions 6 or 19 are currently in force. Any such future directives will be incorporated into Section 7. Planned activities to meet conditions 16 (a), 16(b), 27, 30 and 33 are incorporated into Section 7 of this RMP. Conditions 20 and 34 are met in the proposed final rehabilitation/ closure plan, as shown in **Figure 5**. Conditions 32 and 35 are addressed by the measures presented in the site Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section 6 of this RMP. Topsoil stockpile locations are shown in the Annual Forward Program (previously a MOP).
	6	The lease holder shall comply with any direction, given or which may be given by the Inspector regarding the stabilisation and revegetation of any coal, minerals, mine residues, tailings or overburden situated on the subject area.	
	16	Subject to any specific condition of this authority providing for rehabilitation of any particular part of the subject area affected by mining or activities associated therewith, the lease holder shall: a) shape and revegetate to the satisfaction of the Minister, any part of the subject area that may, in the opinion of the Minister have been damaged or deleteriously affected by mining operations and ensure such areas are permanently stabilised, and, b) reinstate and make safe, including sealing and/or fencing, any excavation within the subject area.	

Document	Condition/ Section	Requirement	Summary of Status
	19	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 the lease holder.	
	20	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.	
	27	The lease holder shall plant such grasses, trees or shrubs or such other vegetation as may be required by the Minister and care for same during the currency of this authority or any renewal thereof, to the satisfaction of the Minister.	
	30	The lease holder shall cover with top dressing material, to the Minister's satisfaction, such parts of the subject area as may be stipulated by the Minister and shall plant and maintain, to the Minister's satisfaction, such grasses, trees or shrubs or such other vegetation as may be required by the Minister.	
	32	The lease holder shall conduct operations in such a manner as not to cause or aggravate soil erosion and the lease holder shall observe and perform any instructions given or which may be given by the Minister with a view to minimising or preventing soil erosion.	
	33	The lease holder shall ensure that any topsoil or other material suitable for topdressing purposes which may be disturbed during operations shall be removed separately for replacement as far as may be practicable and the lease holder shall plant or sow such grasses, shrubs or trees in the replaced surface material as may be considered necessary by the Minister to control or prevent soil erosion.	

Document	Condition/ Section	Requirement	Summary of Status
	34	In the event of any excavations being made the lease holder shall ensure that such are refilled and the topsoil previously removed is replaced and levelled. All such refilling and levelling shall be done to the satisfaction of the Minister.	
	35	The lease holder shall ensure that the run off from any disturbed area including the overflow from any depression or ponded area is discharged in such a manner that it will not cause erosion	
Mining Tenement ML1487	15	The lease holder shall comply with any direction, given or which may be given by the Inspector regarding the dumping, depositing or removal of material extracted as well as the stabilisation and revegetation of any emplacements of coal, minerals, mine residues, tailings or overburden situated on the subject area or the associated colliery holding.	No directives consistent with Condition 15 are currently in force. Any such future directives will be incorporated into Section 7. Planned activities to meet conditions 21, 23 are incorporated into Section 7 of this RMP. Condition 22 is met in the proposed final rehabilitation/ closure plan, as shown in **Figure 5**. Conditions 25 and 30 are addressed by the measures presented in the site Water Management Plan, Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section **6** of this RMP.
	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.	
	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.	
	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.	
	25	The lease holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse, groundwater or	

Document	Condition/ Section	Requirement	Summary of Status
		catchment area or any undue interference to fish or their environment and shall observe any instruction given or which may be given by the Minister with a view to preventing or minimising the contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse, groundwater, or catchment area or any undue interference to fish or their environment.	
	30	The lease holder shall conduct operations in such a manner as not to cause or aggravate soil erosion and the lease holder shall observe and perform any instructions given or which may be given by the Minister with a view to minimising or preventing soil erosion.	
Mining Tenement ML 1548 and Mining Tenement ML 1593	13	(a) Land disturbed must be rehabilitated to a stable and permanent form suitable for a subsequent land use acceptable to the Director-General and in accordance with the Mining Operations Plan so that;- • there is no adverse environmental effect outside the disturbed area and that the land is properly drained and protected from soil erosion. • the state of the land is compatible with the surrounding land and land use requirements. • the landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land. • in cases where vegetation is required and native vegetation is removed or damaged, the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the appropriate vegetation was not native, ant re-established vegetation must be appropriate to the area and at an acceptable density. • The land does not pose a threat to public safety. (b) Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.	Activities to meet condition 13(a) are incorporated into Section 7 of this RMP. Activities to meet condition 13(b) are incorporated into Land Management procedure, and summarised in Section 7 of this RMP. No directives consistent with Condition 14 are currently in force. Any such future directives will be incorporated into Section 7. The requirements of Condition 16 are addressed by the measures presented in the site Air Quality and Greenhouse Gas Management Plan, Water Management Plan, Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section 7 of this RMP.

Document	Condition/ Section	Requirement	Summary of Status
	14	The lease holder must comply with any direction given by the Director-General regarding the stabilisation and revegetation of any mine residues, tailings or overburden dumps situated on the lease area	
	16	Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation), or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or ground waters. The lease holder must observe and perform any instructions given by the Director-General in this regard.	
Mining Tenement CCL 744	7	Disturbed land must be rehabilitated to a sustainable/agreed end use to the satisfaction of the Director-General.	Activities to meet condition 7 are incorporated into Section 7 of this RMP. The requirements of Condition 18 are addressed by the measures presented in the site Air Quality and Greenhouse Gas Management Plan, Water Management Plan, Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section 7 of this RMP.
	18	Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, unless otherwise authorised by a relevant approval, and in accordance with an accepted Mining Operations Plan. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or ground waters. The lease holder must observe and perform any instructions given by the Director-General in this regard.	
Mining Tenement CL 396	15	The lease holder shall comply with any direction, given or which may be given by the Inspector regarding the dumping, depositing or removal of material extracted as well as the stabilisation and revegetation of any dumps of coal, minerals, mine residues, tailings or overburden situated on the subject area or the associated colliery holding.	No directives consistent with Conditions 15, 21 and 23 are currently in force. Any such future directives will be incorporated into Section 7. Activities to meet condition 22 are incorporated into Section 3 of this RMP. The requirements of Condition 25 are addressed by the measures presented in the site Air Quality and Greenhouse Gas Management Plan, Water Management Plan, Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section 7 of this RMP.
	21	Is 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.	
	22	Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this	

Document	Condition/ Section	Requirement	Summary of Status
		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.	
	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.	
	25	The lease holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse or catchment area or any undue interference to fish or their environment and shall observe any instruction given or which may be given by the Minister with a view to preventing or minimising the contamination, pollution, erosion or siltation of any river, stream, creek, tributary, lake, dam, reservoir, watercourse or catchment area or any undue interference to fish or their environment.	
Mining Tenement ML1655	7	Any disturbance as result of activities under this lease must be rehabilitated to the satisfaction of the Director-General.	The intent of this RMP is to enable compliance with this conditions.
Mining Tenement ML1739	2	Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.	The intent of this RMP is to enable compliance with this conditions.
Mining Tenement ML1757	2	Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.	
	2	The registered holder shall comply with any direction, (including directions regarding the spraying, stabilisation and	

Document	Condition/ Section	Requirement	Summary of Status
Mining Tenement MPL263		revegetation of dumps) given or which may be given by the Minister regarding the dumping on the subject area of any: - (a) coal (b) minerals (c) mine residues, or (d) tailings	The intent of this RMP is to enable compliance with these conditions. No directives consistent with Conditions 2, 11, 18, or 20 are currently in force. Any such future directives will be incorporated into Section 7. Conditions 3 and 10 are addressed in the Mt Arthur Coal Closure Management Plan. The requirements of Condition 14 are addressed by the measures presented in the site Air Quality and Greenhouse Gas Management Plan, Water Management Plan, Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section 7 of this RMP. Conditions 24 and 36 are met in the proposed final rehabilitation/ closure plan, as shown in Figure 5. Conditions 21 and 24 are addressed by the measures presented in the site Erosion and Sediment Control Plan and Land Management procedure, which are summarised in Section 7 of this RMP. Topsoil stockpile locations are shown in the Annual Forward Program (previously a MOP). A Topsoil Management Plan is currently being prepared for Mt Arthur Coal to address conditions 22, 23, and 37.
	3	Settling dams or other dams constructed or to be constructed on the subject area shall be constructed, maintained and sealed to the satisfaction of the Minister.	
	10	Upon completion of operations on the surface of the subject area or upon the expiry or sooner determination of this lease, or any renewal thereof, the registered 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 clean, tidy and safe condition to the satisfaction of the Minister.	
	11	If so directed by the Minister the registered 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 the operations hereby authorised.	
	14	The registered holder shall provide and maintain to the satisfaction of the Minister efficient means to prevent contamination, pollution, erosion or siltation of any stream or watercourse or catchment area or any undue interference to fish or their environment and shall observe any instruction given or which may be given by the Minister with a view to preventing or minimising the contamination, pollution, erosion or siltation of any stream, watercourse or catchment area, or any undue interference to fish or their environment	
	18	If directed so to do the Minister the registered holder shall plant such grasses, trees or shrubs or such other vegetation as may be required by the Minister and care for same during	

Document	Condition/ Section	Requirement	Summary of Status
		the currency of this lease or any renewal thereof, to the satisfaction of the Minister	
	20	If so directed by the Minister the registered holder shall cover with topsoil, to the Minister's satisfaction, such parts of the subject area as may be stipulated by the Minister and shall plant and maintain, the Minister's satisfaction, such grasses, trees or shrubs or such other vegetation as may be required by the Minister.	
	21	The registered holder shall conduct operations in such a manner as not to cause or aggravate soil erosion and the registered holder shall observe and perform any instruction given or which may be given by the Minister or the Secretary with a view to minimising or preventing soil erosion.	
	22	The registered holder shall ensure that any topsoil which may be disturbed during operations shall be removed separately for replacement as far as may be practicable.	
	23	In the event of any excavations being made the registered holder shall ensure that such are refilled and the topsoil previously removed is replaced and levelled. All such refilling and levelling shall be done to the satisfaction of the Minister.	
	24	The registered holder shall plant or sow such grasses, shrubs or trees in the replaced surface material as may be considered necessary by the minister to control or prevent erosion.	
	35	Spoil dumps shall be graded by the registered holder to form undulating or flat sloping areas, and shall be planted with grass, shrubs or indigenous trees, as directed by the Minister.	
	36	Upon completion of operations or the sooner determination of this lease the registered holder shall rehabilitate any areas disturbed to the satisfaction of the Minister.	
	37	Any topsoil which may otherwise be buried during the operations shall be removed separately for replacement on the reshaped soil	

3.2 Final Land Use Statement

Final land use is described in the Project Approval 09_0062 MOD 1 and is a combination of native woodland, grazing and water management areas. The final land use is depicted spatially on the Final Landform and Rehabilitation Plan found at **Figure 5.**

Final voids are identified as either backfilled and achieving native woodland or grazing, or as a water management area for water storage or a groundwater sink.

- There are 3 proposed final voids and the approximate dimensions are:
  - Northern Void, surface area 1013ha and 281m below ground level;
  - Belmont void, 40ha and 28m below ground level; and
  - McDonald void, 32ha and 57m below ground level.

Final void dimensions may change as the mine plan develops and the completion criteria will be adjusted accordingly.

3.3 Justification of the Proposed Final Land Use

The proposed final land use has been approved in the Project Approval, as approved by the Planning Assessment Commission (as delegate of the Minister for Planning) on 26 September 2014 (Project Approval 09_0062 MOD 1).

Through the Project approval process the final land use was consulted upon with Community and Government, with the final land uses of grazing and native woodlands prevailing. Native woodlands provide a corridor for enhancement of native flora and fauna for the Hunter Valley. The grazing is commensurate with previous and surrounding land use. Further detail on these land uses can be found in the 2013 Environmental Assessment documentation. Mt Arthur Coal continues to study opportunities for land use and final void use and will continue to discuss these with the community and Government.

3.4 Stakeholder Consultation

The following stakeholders were consulted regarding the Project Approval 09_0062 MOD 1:

- Department of Planning, Industry and Environment (DPIE); Resource Assessments;
- Department of Planning, Industry and Environment (DPIE); Water;
- Department of Planning, Industry and Environment: Biodiversity and Conservation Division (BCD);
- Muswellbrook Shire Council (MSC);
- Mt Arthur Coal Community Consultative Committee (CCC); and
- Neighbouring mining operations.
- Neighbouring community

3.4.1 General Consultation

Mt Arthur Coal regularly engages with local stakeholders regarding proposed operations, including community engagement programs and opportunities. This engagement includes:

- The operation of a 24-hour free call community response line to allow the community to contact the operation directly (1800 882 044);
- Access to information including approval documents, environmental assessments, management plans, environmental audits and environmental management and monitoring reports on a publicly accessible website, at: https://www.bhp.com/environment/regulatory-information/;

- Regular CCC meetings to provide an interface between the community, mine management and the relevant government departments. The community representatives on the CCC are able to share information from CCC meetings with the wider community and to report back on community issues at CCC meetings;
- Regular community contact with local Aboriginal stakeholders and stakeholder groups in relation to Aboriginal archaeology and cultural heritage;
- The Mt Arthur Coal Community Investment Fund which provides financial and in-kind support to local not-for-profit organisations and partners with community development programs;
- Regular attendance at monthly meetings of Muswellbrook Chamber of Commerce and Industry Inc, of which Mt Arthur Coal is an active member, to support local business houses and industry; and
- Participation in the Upper Hunter Mining Dialogue (UHMD), coordinated by the NSW Minerals Council to address cumulative impacts from mining in the Upper Hunter and identify opportunities for improved management and innovation.

Consultation specific to this document version is provided in Appendix 3.

3.4.2 Rehabilitation and Post-mining Land Use Consultation

An outcome of consultation was Mt Arthur Coal's commitment to investigate improved rehabilitation and landform design options, resulting in the Future Landscapes Design Project (FLDP). The FLDP was an initiative to investigate, develop and deliver an integrated landform that is compatible with the surrounding natural landscape. Phase 1 of this project was concluded in May 2014, satisfying the commitment made within the Mt Arthur Coal Modification Project Environmental Assessment. Phase 1 of the project delivered a final landform design.

As a result of the FLDP investigation and consistent with the requirements of the Mt Arthur Coal Modification Project PA 09_0062 MOD 1, the final landform plan as submitted in this RMP was able to be refined, providing an alternative final landform option that reflects the surrounding natural landscape and maintains stability for selected emplacements. Further study and assessment of the Geomorphological design will continue to meet stability, land use, safety and cost requirements.

3.5 Final land Use and Mining Domains

Final land use domains are domains containing post-mining land management units characterised by similar land use.

Mining domains are defined as operational or functional land management units within the mine site, usually with unique purpose and therefore similar geophysical characteristics and rehabilitation treatment requirements.

Domains will require a different rehabilitation methodology to achieve the intended post-mining land use. Domains for Mt Arthur Coal have been determined in consideration of the specific requirements of the mining location and local environment. The key domains for Mt Arthur Coal, as shown in the Final Landform and Rehabilitation Plan (**Figure 5**), are outlined in **Table 3**.

Final land use domains are what will be the final land form and land use. Mining domains are the present domain while the mine is active.

Table 3 Mt Arthur Coal Domains

Mining Domain	Code	Final Land Use Domain	Code
Open Cut Void (Active Mining Area)	1	Final Void	A
Water Management Area	2	Water Management Area	B
Infrastructure Area	3	Rehabilitation Area - Pasture	C
Existing Rehabilitation	4	Rehabilitation Area – Native Woodland	D
Tailings Storage Facility	5	Rehabilitation Area – Box Gum Woodland	E
Overburden Emplacements	6	Onsite Conservation and Offset areas	F
Onsite Conservation and Offset areas	7		

3.6 Asset Register

A register of major assets (including buildings, fixed plant and other infrastructure), categorised by mining domain, is presented in **Table** 4. The asset register also outlines the activities required to demolish and remove the assets during decommissioning.

Table 4 Asset Register

Domain	Assets	Decommissioning/ rehabilitation requirements
Mining Domains		
Open Cut Voids (active mining)	• Crib rooms and remote sewerage tanks; • Truck fill points; • Sediment dams and open drains; • Mobile fuel storage containers; • Noise testing facility; • Magazine facility; • Coal stockpiles; • Water management pumps and polylines.	• Infrastructure demolition and/or removal. • Flushing and removal of water pipelines. • Management of contaminated materials. • Dams reinstated or decontaminated and converted to clean water dams. • Open drains reinstated. • Rehabilitation works (hardstands/roads/tracks, high-wall and low-wall treatment, topsoiling and revegetation).
Water Management Areas	• Whites Creek diversion; • Environmental Dam; • CHPP Dam; • Main Dam; • Dam walls; • Pumps and pump housings; • Polylines; • Open drains and spillways; • Access tracks; • Powerlines; • Alluvial Cut Off Wall and Levee	• Whites Creek diversion partially retained and integrated into post-mine landscape. Redundant section reinstated and rehabilitated. • All three dams will be removed. • Pumps and pump housing structures removed; • Powerlines isolated and removed; • Polylines will be flushed and removed; • Dam walls, spillways and other water management earthworks will be dozed and reshaped; • The dam floor will be assessed for contamination; final trimmed, rock raked and deep ripped; and • Topsoil and revegetation works will be completed.

Domain	Assets	Decommissioning/ rehabilitation requirements
Infrastructure Areas	• Main workshop; • Wash-down bay and mobile plant park-up areas; • CHPP (including structure, equipment and associated buildings); • Coal stockpile areas, including export stockpile; • Electricity sub stations; • Powerlines and light towers; • Fuel farm; • Truck fill Points; • Water treatment plant and potable tanks; • Water pipelines; • Septic tanks; • Conveyor to Bayswater Power station; • Conveyor from CHPP to export stockpile; • Rail loading bin and infrastructure; • Rail loop; • Visual and noise barriers (fencing) along the rail line; • Overpass bridges (2 over Thomas Mitchell Drive and 1 over The New England Highway). • Main administration building and bath house; • Projects Offices and portable buildings; • Powerlines and light towers; and • Sealed roads and car parks.	• All services, including power, water and communications, would be disconnected and terminated and removed or sealed underground. • All buildings, sheds, tanks and fixed plant would be demolished and removed from the site. • Reclaim tunnels would be exposed, the conveyor from CHPP to export stockpile removed and then collapsed. The conveyor to Bayswater Power station will be decommissioned and buried by overburden emplacement. • All fixed plant that contains oil would be de-oiled, and oil would be disposed of by an approved waste oil collection contractor. • Substations would also be decommissioned, demolished and removed from the site. • Concrete footings, pads/slabs and vehicle parking areas would be demolished and, where at final surface will be removed to approximately 1.5 m below the ground where required. • Tank farms and fuel fill points will be decontaminated prior to demolition and disposal. • Where hydrocarbon contamination is identified and a potential impact to sensitive receptors identified, bioremediation would be conducted on site or the material would be transported to an approved and engineered landfill site for disposal. • Residual surface material would be scalped from hardstand areas and unsealed access roads and disposed of in a suitable location to remove the heavily compacted or contaminated material. Access tracks may be left in place as required for maintenance of the rehabilitation works. • Coal stockpile areas would have approximately 0.5 m of material scalped from the surface to ensure all carbonaceous material is removed. • The Rail load-out facility will be decommissioned and rehabilitated at the cessation of operations in 2081. Due to the planned duration of operations at Mt Arthur Coal, BHP Billiton has assumed responsibility for the infrastructure. • The road overpass structures will be removed and the rail alignment will be dozer pushed to an angle of approximately 10 degrees. • Disturbed areas final trimmed, top soiled and revegetated.
Existing Rehabilitation	• Rehabilitated pasture and woodland	• Ongoing monitoring, maintenance and (where required) remedial activities.

Domain	Assets	Decommissioning/ rehabilitation requirements
Tailings Storage Facility	• Tailings Storage Facility (walls and tailings); • Pumps and pump housing; • Access tracks; • Powerlines; • Tailings pipelines under the tailings storage facility	• A detailed tailings dam dewatering and capping methodology will be developed by suitable specialists and technical experts as part of the tailings management strategy. • Infrastructure such as pumps and powerlines removed. • The tailings dam will be required to be capped and rehabilitated at closure. The average thickness of the proposed cap will be a minimum of 3m. • The area will be reshaped to integrate with adjacent landforms, unnecessary access tracks removed, and the area top soiled and revegetated.
Overburden Emplacements	• Access tracks; • Ramps and haul roads; • Powerlines; • Open drains, sediment dams and polylines.	• Powerlines and access tracks removed, except as required for post-mining land use. • Ramps and haul roads backfilled or reshaped with adjacent emplacements. • Polylines flushed back to open cut and removed from site. • Remaining sediment dams integrated into surrounding catchment and drainage lines. • Other open drains and sediment dams reinstated to surface level, final trimmed, top soiled and revegetated.
Conservation Areas	• Access tracks; • Powerlines; • Perimeter and internal fencing; • Cattle yards; and • Subsidiary dams.	• Access tracks may be required for post closure management, however where possible all roads and tracks will be rehabilitated. • Remaining dams will be decontaminated and converted to clean water structures. • The requirements for maintaining powerlines, cattle yards, internal or perimeter fencing will be determined during detailed closure planning. Redundant infrastructure will be removed.

4. Rehabilitation Objectives and Completion Criteria

4.1 Objectives and Criteria

Mt Arthur Coal will rehabilitate mining generated landforms (waste emplacements) to establish a non-polluting, structurally stable landscape to maximise opportunities for a diverse post-mining landscape and range of land uses. It is proposed that final land uses should remain flexible and could include pastoral, commercial forestry, recreation, wildlife habitat corridors and/or other opportunities.

Completion Objectives, Performance Indicators and Rehabilitation Objectives for the mining and final land use domains identified in Section 3 are presented in **Table 5**. These rehabilitation completion criteria are applicable to all rehabilitation at Mt Arthur Coal, inclusive of existing and future rehabilitation, and have been developed to address the rehabilitation obligations listed in **Table 2**.

High level linkages between approval features, objectives of rehabilitation as presented during the approval process, performance indicators and completion criteria of the Mt Arthur Coal rehabilitation program are detailed in MAC-ENC-MTP-047 Rehabilitation Strategy. Australian Coal Association Research Program (ACARP) and other industry-led and publicly available research has been used to justify threshold values for completion criteria and performance standards, and associated validation methodologies.

Table 6 lists the objectives and indicators for each specific rehabilitation phase (see **Section 7.2**).

4.2 Stakeholder Consultation

The following stakeholders were consulted regarding the development of the Rehabilitation Objectives and Completion Criteria as part of the review of this RMP:

- DPIE;
- NSW Resources Regulator;
- DPIE Environment, Energy and Science (ESS);
- Heritage NSW (formally OEH);
- Natural Resources Access Regulator (NRAR) (formally DPIE Water);
- MSC;
- Mt Arthur Coal CCC (community); and
- Neighbouring mining operations.

Consultation relevant to this version of the RMP is provided in the appendices.

Table 5 Domain Specific Rehabilitation Objectives

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
Final voids	Active mining area (open cut void)	Safe	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		Ensure public safety	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		Minimise the adverse socio-economic effects associated with mine closure	Socio-economic risks (associated with mine closure)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		All infrastructure decommissioned and removed	All infrastructure, machinery, plant and equipment are removed	100 % of infrastructure removed unless otherwise agreed with Resources Regulator	• Before/after photographs • Surveyed and marked on as-constructed final landform plans
		Remove buildings, machinery, plant, equipment, constructions and works and such surface shall be rehabilitated and left in a clean, tidy and safe condition			
		Stable	Geotechnical factor of safety (FoS)	Not less than 1.2	• Independent engineering slope failure mode analysis and reporting
		Final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding landforms	Post-mining landform digital terrain model (DTM)	100 % of landforms constructed after	• As-constructed final landform DTM and plans

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
				26 September 2014	
		Land is protected from soil erosion	Groundcover	Not less than 50 %	• Remote sensing • Photographic records • Visual assessment
		Designed as long-term groundwater sinks and to maximise groundwater flows across back-filled pits to the final void.	Groundwater flow with respect to final voids	Voids are sinks for groundwater	• Predictive post-mining groundwater model • Groundwater monitoring • Final void water level monitoring
			Emplacement seepage flowing to final voids	Voids are sinks for emplacement seepage	• Pit shell digital terrain model • Predictive post-mining groundwater model • Groundwater monitoring • Final void water level monitoring
		Minimise to the greatest extent practicable: • The size and depth of final voids	Area (ha) of final voids Northern McDonalds Belmont	 Not greater than 1,050 ha Not greater than 50 ha Not greater than 50 ha	• As-constructed final landform plans
			Depth (m) of final voids Northern McDonalds Belmont	 Not deeper than -110 RL	• As-constructed final landform plans

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
				Not deeper than 156 RL Not deeper than 158 RL	
		• The drainage catchment of final voids	Area (ha) of drainage catchments Northern McDonalds Belmont	 Not greater than 15 km^2 Not greater than 1 km^2 Not greater than 3 km^2	• As-constructed final landform plans
		• Any highwall instability risk	Geotechnical factor of safety (FoS)	Not less than 1.5	• As-constructed final landform plans • Independent engineering slope failure mode analysis and reporting
		• Risk of flood interaction	Probability of inundation in 1 in 1000-year flood event	Probability is negligible	• As-constructed final landform plans • Independent hydrological modelling and reporting
Water management areas	Water management areas Active mining area (open cut void) Overburden emplacement	Safe	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		Ensure public safety	Safety risks (in rehabilitation)	Risks are ALARP (as low as	• Documented formal risk

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
	Infrastructure area			reasonably practicable)	assessment and management process aligned to BHP Our Requirements
		Minimise the adverse socio-economic effects associated with mine closure	Socio-economic risks (associated with mine closure)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		All infrastructure decommissioned and removed Remove buildings, machinery, plant, equipment, constructions and works and such surface shall be rehabilitated and left in a clean, tidy and safe condition	All infrastructure, machinery, plant and equipment are removed	100 % of infrastructure removed unless otherwise agreed with Resources Regulator	• Before/after photographs • Surveyed and marked on as-constructed final landform plans
		Stable	Geotechnical factor of safety (FoS)	Not less than 1.5	• Independent engineering slope failure mode analysis and reporting
		Final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding landforms	Post-mining landform digital terrain model (DTM)	100 % of landforms constructed after 26 September 2014	• As-constructed final landform DTM and plans
		Land is protected from soil erosion	Groundcover	Not less than 50 % on stream banks	• Remote sensing • Photographic records • Visual assessment
		No adverse environment effect outside the disturbed area and the land is properly drained	pH	Between 6.5 and 9.0	• Water sampling and independent analysis and reporting of water

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
					quality in runoff from rehabilitation
			EC	Not more than 600 µS/cm (high flow period) Not more than 900 µS/cm (flood flow period)	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			Turbidity	Not more than 25 NTU	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
		In stream realignments, flow is to mimic pre-development flows for all flood events up to and including the 1 in 100-year ARI	Flow design	Flow is designed to mimic pre-development flow	• Independent hydraulic model and report
		Incorporate erosion control measures based on vegetation and engineering revetments	Groundcover	Not less than 50 % on stream banks	• Remote sensing • Photographic records • Visual assessment
			Revetments	None	• As-constructed final landform plans
		Incorporate structures for aquatic habitat	Structures	Present	• Photographic records • Visual assessment
		Revegetate with suitable native species	Native species	Present	• Independent terrestrial ecology flora assessment and report
Agriculture – grazing	Overburden emplacement Infrastructure area	Safe	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
					BHP Our Requirements
		Ensure public safety	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		Minimise the adverse socio-economic effects associated with mine closure	Socio-economic risks (associated with mine closure)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		All infrastructure decommissioned and removed Remove buildings, machinery, plant, equipment, constructions and works and such surface shall be rehabilitated and left in a clean, tidy and safe condition	All infrastructure, machinery, plant and equipment are removed	100 % of infrastructure removed unless otherwise agreed with Resources Regulator	• Before/after photographs • Surveyed and marked on as-constructed final landform plans
		Stable	Geotechnical factor of safety (FoS)	Not less than 1.5	• Independent engineering slope failure mode analysis and reporting
		Final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding landforms	Post-mining landform digital terrain model (DTM)	100 % of landforms constructed after 26 September 2014	• As-constructed final landform DTM and plans
		Land is protected from soil erosion	Groundcover	Not less than 50 %	• Remote sensing • Photographic records • Visual assessment

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
		No adverse environment effect outside the disturbed area and the land is properly drained	pH	Between 6.5 and 9.0	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			EC	Not more than 600 µS/cm (high flow period) Not more than 900 µS/cm (flood flow period)	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			Turbidity	Not more than 25 NTU	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
		Rehabilitate at least 33 hectares of Class 2 agricultural capability land in the area identified in the rehabilitation plan.	Land and soil capability (LSC) class	Not lower than LSC Class 2	• Land and soil capability assessment in accordance with OEH (2012)
			Area	Not less than 33 ha	• Survey • Remote sensing
		Areas of Class 5 or 6 moderate-low to low agricultural capability land.	Land and soil capability (LSC) class	Areas of LSC Class 5 and 6	• Land and soil capability assessment in accordance with OEH (2012)
Native ecosystem – native woodland	Overburden emplacement Infrastructure area Tailings storage facility	Safe	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
	Onsite conservation and offset areas	Ensure public safety	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		Minimise the adverse socio-economic effects associated with mine closure	Socio-economic risks (associated with mine closure)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		All infrastructure decommissioned and removed Remove buildings, machinery, plant, equipment, constructions and works and such surface shall be rehabilitated and left in a clean, tidy and safe condition	All infrastructure, machinery, plant and equipment are removed	100 % of infrastructure removed unless otherwise agreed with Resources Regulator	• Before/after photographs • Surveyed and marked on as-constructed final landform plans
		Stable	Geotechnical factor of safety (FoS)	Not less than 1.5	• Independent engineering slope failure mode analysis and reporting
		Final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding landforms	Post-mining landform digital terrain model (DTM)	100 % of landforms constructed after 26 September 2014	• As-constructed final landform DTM and plans
		Land is protected from soil erosion	Groundcover	Not less than 50 %	• Remote sensing • Photographic records • Visual assessment

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
		No adverse environment effect outside the disturbed area and the land is properly drained	pH	Between 6.5 and 9.0	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			EC	Not more than 600 µS/cm (high flow period) Not more than 900 µS/cm (flood flow period)	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			Turbidity	Not more than 25 NTU	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
		Restore at least 2,642 hectares of self-sustaining woodland ecosystems in accordance with the rehabilitation plan, including at least 500 hectares of White Box Yellow Box Blakely's Red Gum Woodland.	Area of native woodland	Not less than 2,142 ha	• Survey • As-constructed final landform plans • Remote sensing
		The state of the land is compatible with the surrounding land and land use requirements.	Vegetation integrity score	Not significantly different to surrounding unmined land	• Ecological flora assessment by an accredited person
		The landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land.	Vegetation integrity score	Not significantly different to surrounding unmined land	• Ecological flora assessment by an accredited person
Native ecosystem – Box Gum woodland	Overburden emplacement Existing rehabilitation	Safe	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
	Onsite conservation and offset areas				BHP Our Requirements
		Ensure public safety	Safety risks (in rehabilitation)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		Minimise the adverse socio-economic effects associated with mine closure	Socio-economic risks (associated with mine closure)	Risks are ALARP (as low as reasonably practicable)	• Documented formal risk assessment and management process aligned to BHP Our Requirements
		All infrastructure decommissioned and removed Remove buildings, machinery, plant, equipment, constructions and works and such surface shall be rehabilitated and left in a clean, tidy and safe condition	All infrastructure, machinery, plant and equipment are removed	100 % of infrastructure removed unless otherwise agreed with Resources Regulator	• Before/after photographs • Surveyed and marked on as-constructed final landform plans
		Stable	Geotechnical factor of safety (FoS)	Not less than 1.5	• Independent engineering slope failure mode analysis and reporting
		Final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding landforms	Post-mining landform digital terrain model (DTM)	100 % of landforms constructed after 26 September 2014	• As-constructed final landform DTM and plans
		Land is protected from soil erosion	Groundcover	Not less than 50 %	• Remote sensing • Photographic records • Visual assessment

FLU domain	Mining domain	Rehabilitation objectives	Indicator	Completion criteria	Validation method
		No adverse environment effect outside the disturbed area and the land is properly drained	pH	Between 6.5 and 9.0	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			EC	Not more than 600 µS/cm (high flow period) Not more than 900 µS/cm (flood flow period)	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
			Turbidity	Not more than 25 NTU	• Water sampling and independent analysis and reporting of water quality in runoff from rehabilitation
		500 ha of Box Gum Woodland, including 299.2 ha regeneration area to state 1 consistent with the state and transition model for Box Gum Woodland (Rawlings et al. 2010).	Area	Not less than 500 ha	• Survey • Remote sensing
			Area of state 1 according to Rawlings *et al.* (2010)	Not less than 299.2 ha	• Survey • Remote sensing • Ecological assessment, state and transition model by Rawlings et al. (2010).
		The state of the land is compatible with the surrounding land and land use requirements.	Vegetation integrity score	Not significantly different to surrounding unmined land	• Ecological flora assessment by an accredited person
		The landforms, soils, hydrology and flora require no greater maintenance than that in the surrounding land.	Vegetation integrity score	Not significantly different to surrounding unmined land	• Ecological flora assessment by an accredited person

Table 6 -Rehabilitation Objectives for each Rehabilitation Phase

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
Phase – 1. Decommissioning				
Mining voids that remain in the rehabilitated post-mining landscape will be safe, stable and non-polluting.	Final voids designs assessed against hydrological modelling.	Hydrologist Report	Actual final void dimensions align with hydrological modelling requirements.	N/A
	Hazardous material assessment undertaken and contamination at acceptable level	Hazardous Material Assessment	Hostile geological strata (i.e. carbonaceous, acid generating or spontaneously combustible) covered/sealed before closure. Contaminants less than the assessment criteria.	Yes
	Risk assessment conducted to document security controls to minimise risk of unauthorised access and implementation of risk controls.	Risk Assessment Inspection report	Safety risks associated with remaining voids identified and appropriately managed	Yes
Existing water storage facilities decommissioned and remediated	Major dams (CHPP Dam, Main Dam and Environmental Dam) decommissioned	Inspection Report	Infrastructure removed.	N/A
		Inspection Report	Dams de-watered and ground surface areas remediated (scalped or capped).	N/A
	Sediment dams decommissioned subject to individual risk assessment to determine post-mining status.	Risk Assessment Inspection Report	Sediment dams which assist in the water flow from the final rehabilitation surface will be retained following mine closure. Other dams will be removed and drainage paths re-established.	N/A
	Drainage paths re-instated where not part of wider landform reshaping program.	Inspection Report	Minor, or remote, dams and open drains back-filled to ensure unimpeded landform drainage and seamless integration with surrounding topography.	Yes
	Risk assessment and implementation of risk controls.	Inspection Report	Safety risks associated with remaining infrastructure identified and appropriately managed.	Yes
Infrastructure areas decommissioned and	Status of retained infrastructure legally confirmed.	Legal instruments	Legal instruments established to prove transfer of ownership to another entity, or agreement to	N/A

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
demolished, resulting in safe, stable and non-polluting landscape.			acquire, operate and manage retained infrastructure at mine closure.	
	Mine infrastructure areas decommissioned and cleared of surface infrastructure.	Inspection Report	Surface structures, buildings, roads and rail infrastructure not required for post mining land use have services disconnected and terminated and are demolished and removed.	Yes
	Hazardous material assessment undertaken and contamination at acceptable level Secure and safe containment, remediation and/or removal of waste substances to meet criteria for the proposed final land use in accordance with the relevant contaminated land guidelines under the Contaminated Land Management Act 1997. These include: Guidelines for the NSW Auditor Scheme (EPA, 2006) Guidelines for Consultants Reporting on Contaminated Sites (EPA, 2011) Investigation of Service Station Sites (EPA, 2014)	Hazardous Material Assessment Report	Contaminated materials removed from site, treated or capped.	Yes
	Risk assessment conducted to document security controls to minimise risk of unauthorised access and implementation of risk controls.	Risk Assessment Inspection Report	Safety risks associated with remaining infrastructure identified and appropriately managed.	Yes
TSF capped to ensure long-term containment of emplaced material, with minimal potential for external impact. **(Ex-TSF areas will be reshaped and rehabilitated as per**	Assessment for potential acid generation, and incorporation of findings into capping design	As constructed reports	Capping of tailings.	Yes
	Capping/ treatment of facilities will be appropriately designed and constructed so as to ensure	As constructed reports	Construction of capping layer as per independent consultant's design, or minimum of 3m capping layer of inert material.	Yes

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
Overburden Emplacements for subsequent rehabilitation phases).	geotechnical stability and successful containment of tailings material and hazardous leachate drainage or seepage.	Monitoring Reports	Monitoring regime established for downstream waters.	N/A
		Monitoring Reports	Monitoring indicates no evidence of capping instability or environmental harm.	Yes
		Dam Safety Report	Sign off from the Dam Safety Committee that TSF wall integrity is satisfactory based on assessment by a suitably qualified geotechnical engineer.	Yes
	Risk assessment conducted to document security controls to minimise risk of unauthorised access and implementation of risk controls.	Risk Assessment	Safety risks associated with remaining infrastructure identified and appropriately managed.	Yes
Phase – 2. Landform Establishment				
Overburden emplacements will be reshaped to stable, free draining, non-polluting landforms, compatible with surrounding landforms and selected post-mining landuses.	Reshaped overburden emplacements will be geotechnically stable.	Field monitoring and Survey Data Analysis	Field monitoring and/or survey data analysis indicates reshaped landforms will continue to shed water, with stability and erosion comparable to surrounding non-mined landforms of similar topography.	Yes
		Inspection report	Field monitoring of surface drainage infrastructure demonstrates that constructed drainage features are functioning as designed with no significant failures.	Yes
		As constructed report	Emplacement outer slopes will generally have an overall slope angle of 10 degrees, and up to a maximum slope of 18 degrees, with DPIE RR approval and appropriate management.	Yes
	Reshaped overburden emplacements will be non-polluting.	As constructed report	Potentially high risk materials (coarse rejects, potentially acid-generating or spontaneously combustible) placed in overburden emplacements will be capped by a minimum of 5m of benign material.	Yes
		Inspection report	Absence of hazardous carbonaceous material on the surface of the rehabilitation.	Yes

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
		Inspection/Monitoring report	No active spontaneous combustion areas, as evidenced through established monitoring program.	Yes
	Reshaped overburden emplacements will be compatible with surrounding landforms (mined and non-mined) and selected post-mining landuses.	Survey report	Emplacements will have a maximum average height of RL 360m, with limited features allowed to RL375m to provide positive visual relief.	N/A
		Visual Assessment Reports	Condition 4 of the Visual Assessment Procedure is achieved	N/A
		Agricultural Impact Statement Analysis Reports	Rehabilitated landscapes will be of the land capability class comparable to that of pre-mining as outlined in the Agricultural Impact Statement.	Yes
Phase – 3. Growing Media Development				
Rehabilitated pasture landscapes will support a financially viable and environmentally sustainable livestock grazing operation. **OR** **Rehabilitated areas will be able to support an open native woodland vegetation community to enhance biodiversity and habitat values.**	Pasture rehabilitation land will demonstrate appropriate soil properties so as to support sustainable livestock grazing.	Inspection report	Topsoil placed at a minimum depth of 100 mm.	Yes
		Sampling results	Topsoil will have the following properties, as demonstrated through field survey and analytical testing (including re-rehabilitation stockpile testing). Physical Clay content typically < 30% Structured soils - not massive (heavy clay) or single grained (sand)	Yes
		Sampling Results	Chemical pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm Soil Carbon, Nitrogen and Phosphorous levels to be comparable with reference sites. Cation exchange capacity (CEC) >14 Cmol+/kg	Yes
		Sampling Results	Erosion Potential Or exchangeable sodium capacity (ESP) <5%	Yes

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
		Sampling Results	Nutrients Organic carbon levels (>4.0%) Soil Phosphorous (Colwell P) levels 14-20 mg/kg Fertiliser requirement comparable to similar non-mined grazing land	Yes
Phase – 4. Ecosystem and Landuse Establishment				
Rehabilitated pasture landscapes will support a financially viable and environmentally sustainable livestock grazing operation.	Establish landscape and land-surface suitable for grazing operations.	Inspection report	50 percent of vegetation established and maintained.	Yes
		Inspection Report	Land surfaces within grazing areas are free of obstacles or hazardous terrain.	N/A
		Inspection report	Appropriate infrastructure such access roads, fencing, and a water supply plan completed.	N/A
Post-mining landuses will be consistent with surrounding landuses, and not impact on biodiversity values of adjacent woodland and conservation areas.	Land management measures implemented to control grazing related risks to onsite grazing, neighbouring land and adjacent biodiversity areas.	Weed assessment reports	Weed distribution comparable to local remnant vegetation.	Yes
		Assessment reports	Pest animal infestation comparable to local remnant vegetation.	Yes
		Inspection report	No gullies greater than 20cm depth over transects.	Yes
Rehabilitation will establish at least 2642ha of native woodland vegetation community	Rehabilitated native woodland will be focussed on establishing the vegetation communities as required in of the Project Approval.	Rehabilitation Assessment Report	Rehabilitation species composition (seed mix or tubestock) drawn from the species list in **Table 12**.	Yes
		Rehabilitation Assessment Report	All structural dominant species represented compared with analogue site.	Yes
		Rehabilitation Assessment Report	The diversity, percentage and density of shrubs and juvenile trees with a stem diameter <5cm is comparable to that of the local remnant vegetation.	Yes
		Rehabilitation Assessment Report	The total number of native plant species is comparable to the local remnant vegetation.	Yes

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
		Rehabilitation Assessment Report	The number of tree, shrub and sub-shrub species is comparable to that of the local remnant vegetation.	Yes
	Rehabilitated native woodland will enhance habitat and biodiversity values.	Rehabilitation Assessment Report	Species composition for revegetation will be aimed at establishing a complex community structure consisting of groundcover, understory and canopy according to **Table 8**.	Yes
		Inspection report	No gullies greater than 20cm depth over transects.	Yes
		Biodiversity Plan	Nesting boxes (various bird, squirrel glider, possum and bat) and natural habitat features (including large rocks, logs/coarse woody debris, hollow bearing timber) are placed in established native woodland rehabilitation.	Yes
		Rehabilitation Assessment Report	Number of weed species and surface area comparable to local remnant vegetation.	Yes
		Rehabilitation assessment reports	Pest animal infestation comparable to reference sites.	Yes
		Inspection Report	Where adjacent to selected grazing or operational mining land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	N/A
	Rehabilitated native woodland vegetation will provide faunal habitat and movement corridors by linking existing vegetation communities within and surrounding the mine boundary.	Rehabilitation assessment reports	Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors consistent with the latest version of the DRG Synoptic Plan.	N/A

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
Rehabilitation will establish at least 2142ha of native woodland vegetation community (excluding 500 ha Box Gum Woodland).	An area equivalent to 2142 ha will be established as native woodland.	Rehabilitation assessment report	All areas shown as Native Woodland vegetation community in Figure 5, planted with a native species mix (seed or tubestock) targeted at establishing an open grassy woodland vegetation community.	Yes
Rehabilitation areas will include at least 500 ha of re-established Box Gum Woodland.	A minimum area of 500 ha rehabilitation will be established as Box Gum Woodland.	Rehabilitation assessment reports	The Box-Gum re-establishment area based on the north-eastern slope of Visual Dump 1 will be established with a species mix (seed or tubestock) drawn from the species list presented in **Table 13**.	Yes
Phase – 5. Ecosystem and Landuse Development				
Rehabilitated pasture landscapes will support a financially viable and environmentally sustainable livestock grazing operation.	Landscape and land-surface suitable for grazing operations.	Grazing Potential Assessment Report	Established vegetation cover of at least 70 percent.	Yes
		Agricultural Impact Statement Analysis Report	Rehabilitated landscapes will be of the land capability class comparable to that of pre-mining as outlined in the Agricultural Impact Statement.	Yes
		Inspection Report	Appropriate infrastructure such access roads and fencing, including fencing along drainage lines and adjacent woodland areas, maintained and functional.	N/A
	Soil substrate and pasture cover that will support grazing.	Grazing Potential Assessment Report	Carrying capacity (DSE/ha), crude protein (%), digestibility (%), green dry matter content (kg green DMA/ha) comparable to reference sites.	Yes
		Grazing Potential Assessment Report	Number of weed species and surface area comparable to reference sites.	Yes
Post-mining landuses will be consistent with surrounding landuses, and not impact on biodiversity values of adjacent	Land management measures implemented to control grazing related risks to onsite grazing, neighbouring land and adjacent biodiversity areas.	Rehabilitation Assessment Report	Weed distribution comparable to reference sites.	Yes
		Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Yes

Objective	Performance Indicator	Performance Measure	Rehabilitation Objectives	Link to TARP
woodland and conservation areas.		Rehabilitation Assessment Report	Pest animal infestation comparable to reference sites, with ongoing control.	Yes
		Inspection Report	No gullies greater than 20 cm depth over transects.	Yes
		Monitoring Results	Monitoring of drainage lines indicates no significant concentrated/ accelerated erosion, and no downstream sedimentation or other degradation impacts.	Yes
Rehabilitation will establish at least 2142ha of native woodland vegetation community (excluding 500 ha Box Gum Woodland).	Rehabilitated native woodland will enhance habitat and biodiversity values.	Rehabilitation Assessment Report	The development of a multi-layered community structure is evident, and (for communities > 10 years) consists of canopy, understory and groundcover comparable with reference sites.	Yes
		Rehabilitation Assessment Report	Vegetation health: Age < 10 years - survival of 75% of key species and no evidence of significant vegetation stress (i.e. weed dominance, disease, water stress, premature die-back); Age > 10 years – vegetation health indicators comparable to that of reference sites.	Yes
		Rehabilitation Assessment Report	Observations indicating reproduction (seeding, flowering or second generation plants) recorded at multiple locations within rehabilitated vegetation area.	Yes
		Rehabilitation Assessment Report	Observations indicating nutrient recycling (development of consistent litter layer, litter layer decomposition and cryptogam presence) recorded at multiple locations within rehabilitated vegetation area.	Yes
		Rehabilitation Assessment Report	Fauna monitoring of natural and introduced habitat features (i.e. nesting boxes large rocks, logs/coarse woody debris, hollow bearing timber) indicates colonisation by native species.	Yes
		Rehabilitation Assessment Report	Weed trends comparable to reference sites.	Yes

Table 7 Indicative composition of pasture areas to achieve sustainable livestock production

	Low (less than)	Ideal	Comment
Ground cover	70%	90-100%	Ground cover includes higher slopes 80% cover
Perennial grass component of pasture	Minimum 40%	60-80%	Provides stable grassland base, must maintain some diversity
Dominant grass (% of total pasture cover)	> 40% of total cover	<40%	Lack of diversity, often the least palatable grass dominates
Herbage mass (kg DM/ha) cattle	1000kg (4-5 cm)	2000kg (10cm)	Low herbage mass limits animal production /health, reduces groundcover and litter formation

Table 8 Indicative composition and community structure for targeted vegetation communities.

Proposed Rehabilitation Vegetation Planned Vegetation Community	**Target Condition**		
	Canopy	**Understorey**	**Ground Cover**
Central Hunter Box - Ironbark Woodland	10-40% cover containing target species as described in Table 12 Mt Arthur Coal native woodland species list.	1-10% cover containing target species as described in Table 12 Mt Arthur Coal native woodland species list.	Up to 85% cover and between 0.1 to 1m in height and containing target species as described in Table 12 Mt Arthur Coal native woodland species list.
Central Hunter Ironbark - Spotted Gum – Grey Box Forest	Up to 30% cover comprising containing target species as described in Table 12 Mt Arthur Coal native woodland species list.	1-10% cover containing target species as described in Table 12 Mt Arthur Coal native woodland species list.	Up to 70% cover between 0.1 to 1m in height and containing target species as described in Table 12 Mt Arthur Coal native woodland species list

5. Final Landform and Rehabilitation Plan

The final landform and rehabilitation plan in **Figure 5** shows the location of proposed land uses including the location of the final voids. Work is continuing to find additional areas for woodland across the site and these areas will tie into the existing woodland corridors.

Lease holders must submit the Final Landform and Rehabilitation Plan electronically in accordance with Guideline 5: Rehabilitation GIS Portal - Spatial Data (GIS) Guidelines (NSW Department of Planning and Environment, for approval. The plan will be submitted electronically and will be attached to the RMP when submitted for approval to the NSW Resources Regulator.

5.1 Final Landform and Rehabilitation Plan Submission

5.1.1 Electronic Submission via the Rehabilitation GIS Portal

Lease holders must submit the Final Landform and Rehabilitation Plan electronically in accordance with Guideline 5: Rehabilitation GIS Portal - Spatial Data (GIS) Guidelines (NSW Department of Planning and Environment, for approval. The plan will be submitted electronically and will be included in the RMP at **Figure 5** when submitted for approval to the NSW Resources Regulator.

5.1.2 Hardcopy Submission in the Rehabilitation Management Plan

The Final Landform and Rehabilitation Plan are included in Part 6 of the Rehabilitation Management Plan shown in **Figure 5**.

Denman Road

Thomas Mitchell Drive

Northern Void

McDonalds Void

Belmont Void

Edderton Road

HUNTER RIVER

Whites Creek

Quarry Creek

Ramrod Creek

Fullers Creek

LEGEND

- Railways
- Roads
- Watercourses
- Approved Ancillary Disturbance
- Travelling Stock Reserve
- Drayton Wildlife Refuge Area
- Box Woodland Establishment Area
- Remnant Woodland

Domain

- Post-Mined Lands - Pasture
- Post-Mined Lands - Woodland
- Water Storage
- Offset Areas

BHP

Mapping Services Brisbane

0 500 1,000 1,500 2,000 m

Transverse Mercator Projection.
MGA Zone 56. GDA84 Datum.

MOUNT ARTHUR COAL

FINAL LANDFORM AND REHABILITATION PLAN

Drawn: B. Kleinschmidt	Checked: L. Neil	Date: 4/7/2019	Revision: 0	Filename: MAC_FowardProgram4

Figure 5

6. Rehabilitation Risk Assessment

6.1 Project Approval Risk Assessment

An assessment of environmental risks associated with the operation was undertaken as part of the Modification Project Environmental Assessment. The risk assessment process conducted by the team was aligned with AS/NZS 31000:2009 Risk Management – Principles & Guidelines. A summary of the relevant rehabilitation risks are presented in **Table 9**.

A detailed assessment of the following key potential environment aspects were addressed in the Modification Project Environmental Assessment and the supporting specialist's reports included as appendices to the Environmental Assessment:

- Agricultural Impact Statement;
- Groundwater Impact Assessment;
- Surface Water Assessment;
- Ecological Assessment;
- Aboriginal and Non-Indigenous Cultural Heritage Assessment;
- Air Quality and Greenhouse Gas Assessment;
- Noise and Blasting Assessment;
- Landscape and Visual Impact Assessment;
- Geochemistry Assessment of Overburden and Interburden;
- Socio-Economic Assessment; and
- Road Transport Assessment.

Table 9 Modification 1 Environmental Risk Assessment Summary

Issue / Aspect	Exploration	Land clearance	Mining / production	Landform establishment	Growth medium development	Ecosystem establishment	Ecosystem and land use development	Decommissioning
Erosion and Sedimentation	Mod	Mod	Low	Mod	Low	Mod	Low	Low
Water management	Low	Mod	Mod	Mod	Low	Mod	Mod	Low
Contaminated Land / Hazardous Substances	Low	Mod	Mod	Low	Mod	Mod	Mod	Low
Acid Mine Drainage	Low	Low	Low	Low	Low	Low	Low	Low
Flora and Fauna impact	Low	High	Low	Low	Mod	Low	Low	Low
Weeds and Pests	Low	Low	Low	Low	Mod	Low	Low	Low
Spontaneous Combustion	Low	Low	Low	Low	Low	Low	Low	Low

Issue / Aspect	Exploration	Land clearance	Mining / production	Landform establishment	Growth medium development	Ecosystem establishment	Ecosystem and land use development	Decommissioning
Bushfire	Mod	Mod	Low	Low	Low	Low	Low	Low
Mine Subsidence	Low	Low	Low	Low	Low	Low	Low	Low
Geotechnical issues (eg landform instability)	Low	Mod	Mod	Low	Low	Low	Low	Low
Inadequate or unavailable resources	Mod	Mod	Low	Low	Low	Low	Low	Low

6.2 Rehabilitation Risk Assessment

A risk base approach is used for managing environmental issues at Mt Arthur Coal. Risk assessment prioritises resources and controls to manage the identified risks and to achieve the overarching goals and objectives as shown in **Section 4**. Detailed risk assessments have been completed for rehabilitation risks at Mt Arthur Coal and are reviewed and updated annually through the environmental management system process and compiled in the Mt Arthur Risk Register.

A Bowtie Risk Assessment was undertaken in May 2021 to identify critical controls for managing rehabilitation risks during each rehabilitation phase. **Table 10** shows the results of this rehabilitation risk assessment. A total of 24 risk scenarios were determined to have critical controls. These critical controls are discussed in **Section 7.3**.

Table 10 Rehabilitation Risk Assessment

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
Phase – Active Mining							
Lack of topsoil storage space	Mid term mine Planning process		Current Control	Medium Term Planning	Processes, Records & Physical Works	Important	**Mid Term Mine planning** Create a procedure to detail the topsoil stripping schedule
	Permit to Disturb		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Failure to use the PTD process	Permit to Disturb procedure	Current Control	HSE Department	Procedures	Important	
		Training and Awareness	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Permit to Disturb training** Review the current training needs analysis to include the Permit to disturb process
		Spatial data shows disturbance data	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Topsoil Stockpile Database		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	**Topsoil database** Collate the survey data that already exists and generate a spatial layer that can be used.
Insufficient topsoil available for rehabilitation	Permit to Disturb		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Failure to use the PTD process	Permit to Disturb procedure	Current Control	HSE Department	Procedures	Important	
		Training and Awareness	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Permit to Disturb training** Review the current training needs analysis to include the Permit to Disturb process
		Spatial data shows disturbance data	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Insufficient availability of competent rock on site	Day Works option with Contractor		Current Control	Production	Processes, Records & Physical Works	Important	
	Short Term Planning - The location of the good rock is know or identified in the mining face		Current Control	Short Term Planning	Processes, Records & Physical Works	Important	**Rock Balance** Complete a LOM mass balance of the rock requirements for the site and set up a process with mine planning to ensure that the volumes are recovered and stockpiled to ensure there is not a deficit.
Insufficient stag trees recovered to meet habitat requirements	Staging area in place for the current stag trees		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Permit to Disturb		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Failure to use the PTD process	Permit to Disturb procedure	Current Control	HSE Department	Procedures	Important	
		Training and Awareness	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Permit to Disturb training** Review the current training needs analysis to include the Permit to Disturb process

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
		Spatial data shows disturbance data	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate Provision to execute Closure	Project requirements for closure planning		Current Control	Group	Standard	Important	
	Internal Provision which is separate to CapEx and Opex		Current Control	Group	Standard	Important	
	Annual business planning that keeps the information current		Current Control	Group	Processes, Records & Physical Works	Important	
	Project financial requirements		Current Control	Group	Standard	Important	
	External verification reporting to SX		Current Control	Group	Standard	Important	
	Basis of Estimates procedure		Current Control	Group	Procedures	Important	
Inadequate consideration of closure in the LOM planning process	Long Term Mine Planning Process		Current Control	Long Term Planning	Processes, Records & Physical Works	Important	
	Coal Landform Design Guidelines		Current Control	Long Term Planning	Procedures	Critical Control	
	Short Term Planning Design Standard		Current Control	Short Term Planning	Processes, Records & Physical Works	Important	
Inability to close and rehabilitate LOM tailings facilities	ANCOLD Guidelines		Current Control	Group	Standard	Important	
	Failure to implement a sound strategy or failure to follow the plan	Budget Allocation to meet the expectations of the Strategy	Current Control	Group	Processes, Records & Physical Works	Important	
		Assigned Geotechnical resource to manage tailings dam	Current Control	Group	Processes, Records & Physical Works	Important	
	Dam Safety Committee [closure/rehabilitation expectations]		Current Control	Group	Standard	Important	
Changing stakeholder expectations	Engagement with the CCC		Current Control	Other	Processes, Records & Physical Works	Important	
	Regulator Engagement		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Through memberships with the NSWMC		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Stakeholder Engagement Management Plan		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate records to demonstrate rehabilitation objectives are meet	ARCGIS system		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Document Management System		Current Control	Other	Processes, Records & Physical Works	Important	

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Survey 123 allows capture of pictures and back up in the cloud		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Management Plans	Critical Control	**Rehabilitation Objectives** Review the existing rehabilitation objectives for each rehabilitation phase and develop a matrix system / dashboard to show progression of areas to the next phases as they meet the objectives
	Not meeting the phase objectives	Annual Business Planning	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Extreme weather events are not considered in current closure engineering design	Landscape evolution model [or similar methodology] and bring in climate change considerations		Proposed Control	HSE Department	Processes, Records & Physical Works	Important	
Conflicting opinions on whether the rehabilitation has meet the objectives and completion criteria	Reporting, Records & Data		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Ecological monitoring		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation Objectives are not SMART and fail to demonstrate a suitable outcome	Existing experience, records, data to inform the development of the completion criteria	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Rehabilitation resources (defined roles and responsibilities)	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Demolition and Waste Materials	PFS Demolition report has been completed		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate resources to manage this phase	Budget Allocation		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Resources allocated		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Environment	PIRMP		Current Control	HSE Department	Management Plans	Not Critical	
	Rehabilitation Monitoring against rehabilitation objectives		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation Repair & Maintenance Plan		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation TARP		Current Control	HSE Department	Management Plans	Important	**Rehabilitation TARP** Review the TARP to incorporate specifics from the development of the rehabilitation objectives. Develop a method to track the TARP triggers.

Threat/Consequence	Controls	Control Type	Accountable	Control Category	Criticality	Action
Legal	Rehabilitation TARP	Current Control	HSE Department	Management Plans	Important	**Rehabilitation TARP** Review the TARP to incorporate specifics from the development of the rehabilitation objectives. Develop a method to track the TARP triggers.
	Rehabilitation Repair & Maintenance Plan	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation Monitoring against rehabilitation objectives	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Event Management Solution (reporting process)	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Legal support	Current Control	Group	Processes, Records & Physical Works	Important	
Reputation	Communities Team that manages complaints and feedback	Current Control	Communities and Corporate Affairs	Processes, Records & Physical Works	Not Critical	
	Stakeholder Engagement Management Plan	Current Control	Communities and Corporate Affairs	Management Plan	Important	
	CCC Rehabilitation updates	Current Control	Communities and Corporate Affairs	Processes, Records & Physical Works	Important	
Financial	Budgets and Rehabilitation Provision	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation Repair & Maintenance Plan	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Phase - Decommissioning						
Inappropriate/unavailable equipment and skills	Use of contractors	Current Control	Production	Processes, Records & Physical Works	Important	**Training & Awareness** Review the Training needs Analysis to include decommissioning activities and the use of appropriate equipment
	Mid term mine Planning process	Current Control	Medium Term Planning	Processes, Records & Physical Works	Important	
	Experienced operators	Current Control	Production	Processes, Records & Physical Works	Important	
Land Quality / Contamination results in substantial extra costs or an inability to achieve closure	**Contaminated site study not completed or outcomes not followed** — Approved contaminated Site Provision to the correct amount	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Contaminated site study not completed or outcomes not followed — Annual business planning that keeps the information current	Current Control	Group	Processes, Records & Physical Works	Important	
	Water Management Plan	Current Control	HSE Department	Management Plans	Important	
	Incident report process	Current Control	HSE Department	Processes, Records & Physical Works	Important	

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Waste Handling and Spill response		Current Control	HSE Department	Procedures	Important	
	Chemalert		Current Control	Other	Processes, Records & Physical Works	Important	
	Contaminated Sites Register		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate records to demonstrate rehabilitation objectives and completion criteria are meet	ARCGIS system		Current Control	HSE Department	Processes, Records & Physical Works	Important	-
	Survey 123 allows capture of pictures and back up in the cloud		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Document Management System		Current Control	Other	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Management Plan	Critical Control	**Rehabilitation Objectives** Review the existing rehabilitation objectives for each rehabilitation phase and develop a matrix system / dashboard to show progression of areas to the next phases as they meet the objectives
	Not meeting the phase objectives	Annual Business Planning	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate resources to manage this phase	Budget Allocation		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Resources allocated		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Phase – Landform Establishment							
Geofluv dumps are hard to build and operationally challenging therefore not always achieved	Landform envelope is determined by Project Approval		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Final dumps not constructed as per design	Approved designs provided to he production teams		Current Control	Short Term Mine Planning	Standard	Important	
	Dump design marked out in the field		Current Control	Tech Services	Processes, Records & Physical Works	Important	
	GPS on the equipment		Current Control	Production	Processes, Records & Physical Works	Important	
	Compliance to the design process		Current Control	Short Term Mine Planning	Procedures	Important	
	Dumps not marked out as required	A request is sent to survey to peg the design	Current Control	Short Term Mine Planning	Processes, Records & Physical Works	Important	
		Supervisor has a trimble and they can check	Current Control	Production	Processes, Records & Physical Works	Important	**Training & Awareness** Review the current training needs analysis to include awareness around the importance of the getting the dumps built to design .
		Survey control and checking	Current Control	Tech Services	Processes, Records & Physical Works	Important	

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
		Escalation process for non complying dumps	Current Control	Short Term Mine Planning	Processes, Records & Physical Works	Important	
Hostile materials at/or near surface	Review of materials tracking data to ensure Potentially Acid Forming Materials are dumped to standard		Current Control	Short Term Mine Planning	Processes, Records & Physical Works	Important	**Investigate data tracking** Determine if the materials tracking process is able to determine if PAF material is dumped to standard
	Archerfield and waste coal material is low in the pit so it is generally dumped low in the pit		Current Control	Short Term Mine Planning	Processes, Records & Physical Works	Important	**Archerfield Sandstone and Waste Coal** Review the option to update the standard to include the co disposal of the archerfield sandstone and waste coal
	Design, Construction and Maintenance of Dump Standard		Current Control	Short Term Mine Planning	Standard	Critical Control	**Material Tracking** Investigate the use of MinVU to track the rejects material around the site. Have the data available to be interrogated by the system and know where the reject material is going.
	Standard not followed	All coarse rejects material is to be dumped 30m from the edge and at least 10m deep	Current Control	Production	Processes, Records & Physical Works	Important	-
		All material prone to Spon Comm is to be dumped 30m from the edge and at least 5m deep	Current Control	Production	Processes, Records & Physical Works	Important	**Design Construction and Maintenance of Dump Area Procedure** Review the procedure for adequacy under current processes. Review procedure to include all PAF materials.
		Dump design checklist	Current Control	Short Term Mine Planning	Processes, Records & Physical Works	Important	**Document control** Dump design checklist
		Co-disposal of the rejects material	Current Control	Production	Processes, Records & Physical Works	Important	
	Mine Scheduling Design Standards		Current Control	Short Term Mine Planning	Standard	Important	
	Supervision		Current Control	Production	Processes, Records & Physical Works	Important	
	Material Tracking		Current Control	Short Term Mine Planning	Processes, Records & Physical Works	Important	**Material Tracking** Investigate the use of MinVU to track the rejects material around the site. Have the data available to be interrogated by the system and know where the reject material is going.
	Contaminated land management provedure and contaminated land register		Current Control		Standard	Important	
Geotechnical issues with the material	Material selectively handled base on it being Cat 1 Cat 2 Cat 3 [Cat 1 cant be used in the outside of the dumps which it currently is]		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Selective material** Review the placement of the Cat 1 or sub Cat 1 material on the edges of rehabilitation dumps [it is currently assumed that Cat 1 material is ok to be used]. It may require that Cat 2 is preferred. Include specifications from BHP Landform Design Guidelines regarding material types selected for us on the outer face of rehab with the Design,

Threat/Consequence	Controls	Control Type	Accountable	Control Category	Criticality	Action
						Construction and Maintenance of Dump Standard Implement the outcomes of the review and update the standards that are appropriate.
	Drilling and material characterisation to support the selective handling	Current Control	Tech Services	Processes, Records & Physical Works	Important	
	Planning to ensure that all unsuitable material is be placed within the dump	Current Control	Mid Term Mine Planning	Processes, Records & Physical Works	Important	
Unplanned ponding and slumping in landforms due to staged geofluv designs across the approved landform	Geofluv design by a suitably qualified design engineer	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Geofluv review** Ensure that the temporary landform outside the geofluv design footprint is considered and where required temporary mitigation employed to avoid ponding.
	As constructed survey	Current Control	Production	Processes, Records & Physical Works	Important	
Insufficient habitat structures and water resource structures incorporated	Geofluv design by a suitably qualified design engineer	Current Control	Mid Term Mine Planning	Processes, Records & Physical Works	Important	
Failure to address legacy landform issues results in requirement to rework or rehabilitation failures	Built to the approved design of the day	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Legacy Land form residual risk** Complete a review of legacy landforms to understand any residual risk aspects. Implement the outcomes of the review.
	Landscape evolution model [or similar methodology] and bring in climate change considerations	Proposed Control	HSE Department	Processes, Records & Physical Works	Important	**Landscape evolution model** Review the use of Landscape evolution model as part of the land form design to test the implications of changes in the weather on the engineering designs being applied at the site. Include an assessment of legacy rehabiltation areas.
Inadequate resources to manage this phase	Budget Allocation	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Resources allocated	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate records to demonstrate rehabilitation objectives and completion criteria are meet	ARCGIS system	Current Control	HSE Department	Processes, Records & Physical Works	Important	**ARCGIS** Review the current ARCGIS structure as it relates to rehabilitation and closure planning to ensure the appropriate records are being kept and are accessible for future use.
	Survey 123 allows capture of pictures and back up in the cloud	Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Document Management System	Current Control	Other	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria	Current Control	HSE Department	Management Plan	Critical Control	**Rehabilitation Objectives** Review the existing rehabilitation objectives for each rehabilitation phase and develop a matrix system / dashboard to show progression of areas to the next phases as they meet the objectives.

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Not meeting phase objectives	Annual Business Planning	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Changing stakeholder expectations	Stakeholder Engagement Management Plan		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Integration of operational and Project Approval experience to put forward achievable goals		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Existing topsoil contamination / loss of quality	Direct Placement		Current Control	Short Term Planning	Processes, Records & Physical Works	Important	**Direct Placement** Review the option for a central topsoil stockpiling option.
	Topsoil Stockpile Database		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	**Topsoil database** Collate the survey data that already exists and generate a spatial layer that can be used.
	Mid term mine Planning process		Current Control	Medium Term Planning	Processes, Records & Physical Works	Important	**Mid Term Mine planning** Create a procedure to detail the topsoil stripping schedule
	Permit to Disturb		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Failure to use the PTD process	PTD procedure	Current Control	HSE Department	Procedures	Important	
		Training and Awareness	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Permit to Disturb training** Review the current training needs analysis to include the Permit to Disturb process
		Spatial data shows disturbance data	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Failure to characterise soils for use in rehabilitation	Topsoil Stockpile Database		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	**Topsoil database** Collate the survey data that already exists and generate a spatial layer that can be used. **Topsoil Management Plan** Finalise the development of the Topsoil management plan Covers off all aspects of topsoil management for the site covers off survey, geomatics, sampling, etc Communicate the outcomes Implement the Management plan
	Permit to Disturb		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Failure to use the PTD process	Permit to Disturb procedure	Current Control	HSE Department	Procedures	Important	
		Training and Awareness	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Permit to Disturb training** Review the current training needs analysis to include the Permit to Disturb process.

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
		Spatial data shows disturbance data	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Unsuitable topsoil depths on rehabilitation when the soil is spread	Rehab Management Plan outlines depth expectations		Current Control	HSE Department	Management Plan	Important	
	Experienced Supervisors		Current Control	Production	Processes, Records & Physical Works	Important	
	Rehabilitation Manual		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
	Materials Tracking using MinVU		Current Control	Production	Procedures	Important	**MinVU schedule** Review the data in MineVu to ensure that the data is relevant to the topsoil movement around the site .
Unsuitable soil parameters (inc. Sodicity and surface crusting)	Soil Sampling		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Soil sampling is not conducted or results are not interpreted correctly	Rehabilitation Manual	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
		Topsoil Stockpile Database	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Topsoil database** Collate the survey data that already exists and generate a spatial layer that can be used.
		Independent expert advice	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Soil Grab samples on material spread to assist in amelioration	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Soil sample of *materials*** Include a review of the existing sampling processes to include: *materials to be sampled, when and how to sample stockpiled material* and follow up sampling of spread media. Include the outcomes in the review of the topsoil management plan.
	Application of gypsum [and other ameliorants as required]		Current Control	Production	Processes, Records & Physical Works	Important	
	Timing with the surface tilling to avoid crusting		Current Control	Production	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
Unsuitable geochemical properties of material below the growth media	Design Construction and Maintenance of Dump Area Procedure		Current Control	Tech Services	Procedures	Critical Control	**Design Construction and Maintenance of Dump Area Procedure** Review the procedure for adequacy under current processes. Review procedure to include all PAF materials.
	Design Construction and	Experienced Supervisors	Current Control	Production	Processes, Records & Physical Works	Important	

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Maintenance of Dump Area Procedure Fails	Short Term Mine Plans	Current Control	Short Term Mine Planning	Procedures	Important	**Design Construction and Maintenance of Dump Area Procedure** Review the procedure for adequacy under current processes. Review procedure to include all PAF materials.
	Materials Tracking using MinVU		Current Control	Production	Procedures	Important	**MinVU schedule** Review the data in MineVu to ensure that the data relevant to the PAF material is being collected and can be interrogated. eg coarse rejects, PAF material - review the data collected to support rehab process,
	Sampling of waste rock		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Soil sample of *materials*** Include a review of the existing sampling processes to include: *materials to be sampled, when and how to sample stockpiled material* and follow up sampling of spread media. Include the outcomes in the review of the topsoil management plan.
	Rehabilitation Manual		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
Biologically depleted growth media (stockpile too high too long)	Compost application to soil after it is spread		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Compost Application** Review the current compost application processes and implement any updates or changes so that it can be included in the rehabilitation manual.
	Rehabilitation Manual		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
Inadequate seedbed preparation	Compaction ripping; tillage		Current Control	Production	Processes, Records & Physical Works	Important	
	Rehabilitation Manual		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
Unsuitable weather conditions	Use of weather forecasts to schedule topsoil placement and preparation		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Weather** Review the rehabilitation manual to include greater guidance around weather delays and scheduling to ensure that the success of rehabilitation is optimised. Investigate what forecasting tools are available to assist in rehabilitation planning. Forecast for weed management which may influence budgets. **1SAP Strategy**

Threat/Consequence	Controls	Control Type	Accountable	Control Category	Criticality	Action
						Update the 1SAP Strategies to capture the updates to the REMP.
	Rehabilitation Manual	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation manual** Review the existing BHP rehabilitation manual to include the site specific process around rehabilitation and ensure that these are adopted by the contractor.
Use of herbicides to control weeds immediately after spreading topsoil are ineffective	Contractor sets up a weed action plan	Current Control	HSE Department	Processes, Records & Physical Works	Important	-
	Use of an appropriately qualified weed spraying company	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Erosion and loss of topsoil	Erosion & Sediment Control Plan	Current Control	HSE Department	Management Plan	Important	
	Inspections and Monitoring	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Landscape evolution model [or similar methodology] and bring in climate change considerations	Proposed Control	HSE Department	Processes, Records & Physical Works	Important	**Landscape evolution model** Review the use of landscape evolution model as part of the land form design to stress test the implications of changes in the weather on the engineering designs being applied at the site Include an assessment of legacy rehabilitation areas
	Temporary stabilsiation	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Temporary Stabilisation** Finalise trial into temporary stabilisation (material and application)
Inadequate records to demonstrate rehabilitation objectives and completion criteria are meet	ARCGIS system	Current Control	HSE Department	Processes, Records & Physical Works	Important	-
	Survey 123 allows capture of pictures and back up in the cloud	Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Document Management System	Current Control	Other	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria	Current Control	HSE Department		Critical Control	**Rehabilitation Objectives** Review the existing rehabilitation objectives for each rehab phase and develop a matrix system / dashboard to show progression of areas to the next phases as they meet the objectives
	Not meeting phase objectives Annual Business Planning	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate resources to manage this phase	Budget Allocation	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Resources allocated	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Changing stakeholder expectations	Stakeholder Engagement Management Plan	Current Control	HSE Department	Processes, Records & Physical Works	Important	

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Integration of operational and Project Approval experience to put forward achievable goals		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Phase – Ecosystem Establishment							
Less than adequate quantity of seed/tube stock	Alternate Providers for seed		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Seed harvested from the offset areas as well as prior to stripping		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
Poor quality of seed/tube stock	Current seed supplier has a QA/QC process		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Not able to demonstrate that the structure and function of the ecosystem has been achieved	Rehabilitation and Ecological Monitoring Program (REMP)		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	**Rehabilitation and Ecological Monitoring Program (REMP)** Review the REMP to align with the preferred rehabilitation objectives and completion criteria derived from the project approvals. Update the REMP to include updated monitoring practices (soil sampling, remote sensing, weed assessments etc) **1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
	Failure to carry out adequate monitoring	Rehabilitation objectives and completion criteria	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Relevant Approvals	Current Control	HSE Department	Standard	Important	
Not identifying that an area is able to be moved through the ESF02 process where it can be signed off	Rehabilitation and Ecological Monitoring Program (REMP)		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	**Rehabilitation and Ecological Monitoring Program (REMP)** Review the REMP to align with the preferred rehabilitation objectives and completion criteria derived from the project approvals. Update the REMP to include updated monitoring practices (soil sampling, remote sensing, weed assessments etc) **1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
	Failure to carry out adequate monitoring	Rehabilitation objectives and completion criteria	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Relevant Approvals	Current Control	HSE Department	Standard	Important	

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
Changing stakeholder expectations	Stakeholder Engagement Management Plan		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Integration of operational and Project Approval experience to put forward achievable goals		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Conflicting opinions on whether the rehabilitation has met the objectives and completion criteria	ARCGIS system		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Rehabilitation Objectives are not SMART and fail to demonstrate a suitable outcome	Existing experience, records, data to inform the development of the completion criteria	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Rehabilitation resources (defined roles and responsibilities)	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation and Ecological Monitoring Program (REMP)		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation and Ecological Monitoring Program (REMP)** Review the REMP to align with the preferred rehabilitation objectives and completion criteria derived from the project approvals. Update the REMP to include updated monitoring practices (soil sampling, remote sensing, weed assessments etc) **1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
Inadequate resources to manage the revegetation phase	Budget Allocation		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Resources allocated		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate records to demonstrate rehabilitation objectives and completion criteria are meet	ARCGIS system		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Survey 123 allows capture of pictures and back up in the cloud		Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Document Management System		Current Control	Other	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion criteria		Current Control	HSE Department	Management Plan	Critical Control	**Rehabilitation Objectives** Review the existing rehabilitation objectives for each rehab phase and develop a matrix system /

Threat/Consequence	Controls	Control Type	Accountable	Control Category	Criticality	Action
						dashboard to show progression of areas to the next phases as they meet the objectives.
	Not meeting the phase objectives Annual Business Planning	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Extreme Weather Events	Weather forecasting to inform rehabilitation decisions	Proposed Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP. **Weather** Review the rehabilitation manual to include greater guidance around weather delays and scheduling to ensure that the success of rehabilitation is optimised. Investigate what forecasting tools are available to assist in rehabilitation planning. Forecast for weed management which may influence budgets.
	Rehabilitation TARP	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation TARP** Review the TARP to incorporate specifics from the development of the rehabilitation objectives. Develop a method to track the TARP triggers.
	Annual Rehabilitation Planning considers the weather forecast	Proposed Control	HSE Department	Processes, Records & Physical Works	Important	**Weather** Review the rehabilitation manual to include greater guidance around weather delays and scheduling to ensure that the success of rehabilitation is optimised. Investigate what forecasting tools are available to assist in rehabilitation planning. Forecast for weed management which may influence budgets.
Bushfire impact the rehabilitation whilst it is establishing	ERT on site to respond	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Unauthorised access to rehabilitation areas which results in damage	Signs & Fencing in the rehabilitation areas	Current Control	Production	Processes, Records & Physical Works	Important	**Fencing of sensitive areas** Review the procedure for fencing sensitive areas regarding minimum standards for signs and fencing.
	Permit to Disturb	Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	**Polygon in GPS** Investigate the use of a "do not enter"polygon that could be loaded into the machines to notify access Could include the offsets and project approval boundary.
	Training & Awareness for supervisors	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Training and awareness** Review the training needs analysis to include unauthorised access to rehabilitation areas.
Weed colonisation of rehabilitation areas	Weed Treatment	Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	**Weed Monitoring** Capture the current weed monitoring program within the REMP.

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Weed Treatment not undertaken	Budget for weed control	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Resources allocated to weed management	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Weed Action Plan		Current Control	HSE Department	Management Plan	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
	Careful management of growth media to avoid weeds (eg scalping or no topsoil, etc)		Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Weed Management of the Topsoil Stockpiles / growth media		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Selective placement of topsoil** Review the use of selective placement of topsoil only in pasture areas to minimise the issues associated with weed competition. **1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
	Weed Mapping and Priority Management		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Weed Spraying Mapping** Formalise a template for the capture of weed treatment (inc. dates, areas, target species, etc) and have that as a GIS layer.
	Careful management of seed (clean seed)		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Third Party QA/QC** Finalise the process of third party QA/QC on seed. Capture the process in the REMP. Include the information in the GIS and records system.
	Routine Rapid Walkover assessment		Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
Failed areas of vegetation establishment	Annual Revegetation monitoring program		Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
	Rehabilitation and Ecological Monitoring Program (REMP)		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP. **Rehabilitation and Ecological Monitoring Program (REMP)** Review the ecological monitoring program (REMP) to align with the preferred rehabilitation objectives and completion criteria derived from the project approvals. Update the REMP to include updated monitoring practices (soil sampling, remote sensing, weed assessments etc)

Threat/Consequence	Controls		Control Type	Accountable	Control Category	Criticality	Action
	Failure to carry out adequate monitoring	1SAP Strategies	Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP to capture the updates to the REMP.
		Routine Rapid Walkover assessment	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Survey 123 form saved in the cloud	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation TARP		Current Control	HSE Department	Procedures	Important	**Rehabilitation TARP** Review the TARP to incorporate specifics from the development of the rehabilitation objectives. Develop a method to track the TARP triggers.
	Repair & Maintenance of the rehabilitation area		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Desired species aren't present	Rehabilitation and Ecological Monitoring Program (REMP)		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
	Failure to carry out adequate monitoring	1SAP Strategy	Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
		Routine Rapid Walkover assessment	Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
		Annual Revegetation monitoring program	Current Control	HSE Department	Processes, Records & Physical Works	Important	
		Appropriate skilled resources allocated	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehabilitation TARP		Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation TARP** Review the TARP to incorporate specifics from the development of the rehabilitation objectives. Develop a method to track the TARP triggers.
	Repair & Maintenance of the rehabilitation area		Current Control	HSE Department	Processes, Records & Physical Works	Important	
Animal Predation or rehab areas	Pest Control Program		Current Control	HSE Department	Processes, Records & Physical Works	Critical Control	
	Pest Control not undertaken	1SAP Strategy	Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
		Appropriate skilled resources allocated	Current Control	HSE Department	Processes, Records & Physical Works	Important	

Threat/Consequence	Controls	Control Type	Accountable	Control Category	Criticality	Action
	Routine Rapid Walkover assessment	Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP. **Pest and disease inspection** Review the walkover to ensure that predation is included. Include a rust of plant disease.
	Rehabilitation TARP	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Rehabilitation TARP** Review the TARP to incorporate specifics from the development of the rehabilitation objectives. Develop a method to track the TARP triggers.
	Opportunistic Sightings	Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Physical barriers on tubestock (hare tubes, guards, etc)	Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Ecological monitoring identifies predators	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate resources to manage the revegetation phase	Budget Allocation	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Resources allocated	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Inadequate records to demonstrate rehabilitation objectives and completion criteria are meet	ARCGIS system	Current Control	HSE Department	Processes, Records & Physical Works	Important	**ARCGIS** Review the current ARCGIS structure as it relates to rehab and closure planning to ensure the appropriate records are being kept and are accessible for future use.
	Survey 123 allows capture of pictures and back up in the cloud	Current Control	HSE Department	Processes, Records & Physical Works	Not Critical	
	Document Management System	Current Control	Other	Processes, Records & Physical Works	Important	
	Rehabilitation objectives and completion critiera	Current Control	HSE Department	Management Plan	Critical Control	**Rehabilitation Objectives** Review the existing rehabilitation objectives for each rehab phase and develop a matrix system / dashboard to show progression of areas to the next phases as they meet the objectives.
	Not meeting the phase objectives Annual Business Planning	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Extreme Weather Events	Weather forecasting to inform rehabilitation decisions	Proposed Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP. **Weather** Review the rehabilitation manual to include greater guidance around weather delays and scheduling to ensure that the success of rehabilitation is optimised. Investigate what forecasting tools are available to

Threat/Consequence	Controls	Control Type	Accountable	Control Category	Criticality	Action
						assist in rehabilitation planning. Forecast for weed management which may influence budgets.
	Annual Rehab Planning considers the weather forecast	Proposed Control	HSE Department	Processes, Records & Physical Works	Important	**Weather** Review the rehabilitation manual to include greater guidance around weather delays and scheduling to ensure that the success of rehabilitation is optimised. Investigate what forecasting tools are available to assist in rehabilitation planning. Forecast for weed management which may influence budgets.
	Rehabilitation TARP	Current Control	HSE Department	Processes, Records & Physical Works	Important	**1SAP Strategy** Update the 1SAP Strategies to capture the updates to the REMP.
Bushfire impact the rehabilitation whilst it is establishing	ERT on site to respond	Current Control	HSE Department	Processes, Records & Physical Works	Important	
Unauthorised access to rehab areas which results in damage	Signs & Fencing in the rehab areas	Current Control	Production	Processes, Records & Physical Works	Important	**Fencing of sensitive areas** Review the procedure for fencing sensitive areas regarding minimum standards for signs and fencing.
	Training & Awareness for supervisors	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Training and awareness** Review the training needs analysis to include unauthorised access to rehabilitation areas.
	Permit to Disturb	Current Control	HSE Department	Processes, Records & Physical Works	Important	**Polygon in GPS** Investigate the use of a "do not enter"polygon that could be loaded into the machines to notify access. Could include the offsets and project approval boundary.
Changing stakeholder expectations	Stakeholder Engagement Management Plan	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Rehab objectives and completion criteria	Current Control	HSE Department	Processes, Records & Physical Works	Important	
	Integration of operational and Project Approval experience to put forward achievable goals	Current Control	HSE Department	Processes, Records & Physical Works	Important	

7. Rehabilitation Implementation

7.1 Life of Mine Progressive Rehabilitation Schedule

Rehabilitation at Mt Arthur Coal for the Annual Forward Program can be seen in **Figure 6**.

295000
300000
6425000
6420000
6415000
ML1757
ML1487
ML1548
ML1358
ML1593
ML1655
AUTH171
MPL263
CCL744
CL396
CL395
ML1739
CL229
AUTH437
EL5965

Planned Rehabilitation

- FY22
- FY23
- FY24
- FY25
- FY26

BHP
Geospatial Team
Brisbane

0 500 1,000 m

GDA 1994 MGA Zone 56
Transverse Mercator

MOUNT ARTHUR MINE
REHABILITATION PLAN TO FY26

Drawn: B. Lang	Date: 21/06/2021	Revision: 1	FIGURE 6
Checked: J. Deacon	Filename: 20210618-5.mxd		

7.2 Rehabilitation phases and general methods

As management domains progress from active or operational domains through to rehabilitated final or post-mining domains, they will progress through a series of Rehabilitation Phases. As well as the Operational phase, which precedes rehabilitation and accounts for all of the domains outlined in this RMP, the phases nominated for the Mt Arthur Coal closure planning process consist of:

- **Active Mining** – Activities undertaken during operations to enhance rehabilitation
- **Decommissioning –** the process of removing mining infrastructure and removing contaminants and hazardous materials.
- **Landform Establishment** – incorporates gradient, slope, aspect, drainage, substrate material characterisation and capping of hostile materials;
- **Growing Media Development** – incorporates physical, chemical and biological components of the growing media and ameliorants that are used to optimise the potential of the media in terms of the preferred vegetative cover;
- **Ecosystem and Land use Establishment** – incorporates revegetated lands and habitat augmentation; species selection, species presence and growth together with weed and pest animal control / management and establishment of flora;
- **Ecosystem and Land use Sustainability** – incorporates components of floristic structure, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape; and
- **Relinquishment** – land use and landscape is deemed as suitable to be relinquished from the Mining Lease.

By dividing the temporal progression of rehabilitation into these phases, and allocating progress indicators and relinquishment criteria (as discussed in **Section 4**). Mt Arthur Coal is able to track the development of rehabilitation to final completion and relinquishment. Not all rehabilitation phases are relevant to each management domain. Table 6 shows the rehabilitation objectives for each phase.

7.3 Rehabilitation Risk Management

Mt Arthur Coal is committed to delivering high standards of environmental performance to meet or exceed legal and other requirements. The following sub-sections present a summary of the management measures implemented at Mt Arthur Coal to address key rehabilitation risks identified in **Section 6**. The Rehabilitation and Ecological Monitoring Procedure specifies the required management of rehabilitation from monitoring to maintenance (see **Section 9**).

7.3.1 Active Mining

Mine Planning

Rehabilitation is integrated into the mine planning process in the following ways:

- Inclusion of Landform Establishment and Growth Medium Development timeframes in mine plan.
- 5 Year Planning Cycle includes rehabilitation areas and is updated annually; and
- Defined accountabilities agreed to by internal stakeholders.

Relevant BHP and Mt Arthur Coal documents providing detailed guidance in the mine planning process include:

- BHP Coal Landform Design Guidelines – design guidance for placement and slope angles of material including topsoil, different classifications of rock, carbonaceous material, and material with acid mine drainage potential. These guidelines were identified as a critical control to ensure adequate consideration of closure in the life of mine process;
- MAC-PRD-STD-003 Design Construction and Maintenance of Dump Areas – production standard to ensure all productive overburden dumps and coal stockpiles are set out in a safe uniform design, well-constructed and routinely maintained at Mt Arthur Coal;

- NEC-HSE-PRO-001 Permit to Disturb Procedure – procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance. This includes ground disturbing works, removal of vegetation, disturbing fauna, altering existing landforms, watercourse diversions, change to drainage patterns or runoff quality, works in marine areas, construction of new infrastructure, or a change in land use;
- MAC-ENC-MTP-047 Rehabilitation Strategy - provides a framework to create a safe, stable, non-polluting and sustainable landscape that achieves the intended final land uses and is consistent with key stakeholder agreed social and environmental values;
- MAC-ENC-MTP-052 Mt Arthur Coal Mining Operations Plan (now Annual Forward Plan) – provides the next 3-year mining and rehabilitation schedule, a summary of the spatial progression of rehabilitation and is the basis for calculation of the rehabilitation cost estimate;
- MAC Closure Management Plan – describes the closure objectives and commitments of Mt Arthur Coal and how they will be met over the full life cycle of the mine. The document also supports the closure cost estimate, guides progressive rehabilitation and outlines any knowledge gaps that need addressing to ensure mine closure is planned and systematic;
- Coal Rehabilitation RACI (Responsible, Accountable, Consult and Inform) – assigns responsibilities and accountabilities for rehabilitation planning and execution activities and lists the associated documents to be adhered to;and
- BHP Target Environmental Outcomes (Our Requirements for Environment and Climate Change) – includes BHP's commitment to taking action to reduce operational greenhouse gas emissions, building resilience to the risks from physical impacts of climate change, transition to a lower carbon economy, and improving management of water and water governance.

Topsoil Retention

Soil and land capability assessments conducted as part of the Mt Arthur Coal Open Cut Consolidation Project EA (2009) and the Mt Arthur Coal Open Cut Modification Project EA (2013) have identified topsoil resources, suitable for recovery and use as a growth medium in post-mining rehabilitation, across the majority of the highwall areas. Recommended topsoil recovery depths are 100 – 300mm, based on the presence of a moderately to strongly structured sandy to silty loam A horizon. Duplex soils are common, and stripping of heavy clay subsoils is to be avoided. Some soils also displayed sodic subsoil properties and measures have been implemented to ensure these materials do not contaminate topsoil resources.

Prior to topsoil stripping, a pre-stripping assessment is made. This assessment will ground-truth the broad scale stripping recommendations presented in the relevant soil stripping plan and delineate local topographical and drainage variations to topsoil depth. The final stripping plan will be modified appropriately to ensure all suitable topsoil material is recovered, without contamination by subsoils.

Relevant BHP and Mt Arthur Coal documents providing detailed management of topsoil include:

- MAC-ENC-PRO-012 Land Management Procedure - details requirements of vegetation clearing, topsoil stripping and topsoil stockpiling to ensure activities are undertaken in an environmentally responsible manner and in accordance with statutory requirements and site environmental management plans;
- NEC-HSE-PRO-001 Permit to Disturb Procedure - procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance. This Procedure was identified as a critical control to manage the following topsoil risks in the active mining phase:
    - Insufficient topsoil available for rehabilitation; and
    - Lack of topsoil storage space;
    -
- BHP Coal Rehabilitation Manual - describes methods to achieve satisfactory rehabilitation and provides a framework for all rehabilitation activities after final placement and reshaping of the underlying landform..

In addition, Mt Arthur Coal are currently preparing a Topsoil Management Plan which will outline the requirements for topsoil pre-stripping, characterisation, handling, storage and placement.

Rehabilitation Enhancement

Practices to enhance rehabilitation at Mt Arthur Coal include retention of habitat structures and collection of native seed as part of pre-strip activities.

Where practicable Mt Arthur collects hollow bearing trees, rock piles, tree stumps and wood piles for re-use

Mt Arthur Coal will, where practicable, continue a program of native seed harvesting from remnant native vegetation located on Mt Arthur Coal owned land. This seed will be used in rehabilitation direct-seeding, or to develop tubestock for planting in rehabilitation and regeneration activities.

Relevant BHP and Mt Arthur Coal documents providing detailed management of rehabilitation enhancement activities include:

- MAC-ENC-PRO-012 Land Management - details requirements of vegetation clearing, topsoil stripping and topsoil stockpiling to ensure activities are undertaken in an environmentally responsible manner and in accordance with statutory requirements and site environmental management plans;

  MAC-ENC-MTP-050 Biodiversity Management Plan – outlines the biodiversity management and monitoring approach that addresses both State and Commonwealth approval conditions at Mt Arthur Coal. Management measures to conserve, restore and revegetate land and associated environmental monitoring procedures, which have been developed to assess and report on the adequacy of ecological management strategies, are described; and
- NEC-HSE-PRO-001 Permit to Disturb Procedure - procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance. This Procedure was identified as a critical control to manage the risk that there will be insufficient stag trees recovered to meet habitat requirements in rehabilitation.

Visual Amenity

A visual impact of mining operations was undertaken as part of the Mt Arthur Coal Open Cut Modification Project EA, and overburden emplacement design incorporates measures to minimise visual impact. Management measures designed to reduce visual impact include:

- The integration of tree corridors on overburden emplacements as part of progressive rehabilitation;
- The retention of the eastern flank of MacLean's Hill to assist in creating landscape diversity at the foot of overburden emplacements;
- Modifying final void high walls and low wall slopes to minimise final disturbance;
- Incorporating micro relief features throughout overburden emplacements to provide an enhanced naturally appearing landform and fauna habitat;
- The practical consideration of geomorphic type designs on emplacements to sustainably manage water and create a natural looking and stable landform;
- The strategic design and rehabilitation of overburden emplacements for increased visual shielding of operations;
- Establishing visual and ecological planting patterns of native trees to achieve landscape patterns that complement the existing spatial distribution of tree and grass cover in a grazing landscape; and
- Minimising exposure of work areas to sensitive receivers where possible, largely through the timely rehabilitation of visible overburden emplacements.

Relevant BHP and Mt Arthur Coal documents providing detailed management of visual amenity include

- MAC-ENC-MTP-050 Biodiversity Management Plan -– outlines the biodiversity management and monitoring approach that addresses both State and Commonwealth approval conditions at Mt Arthur Coal;
- MAC-ENC-MTP-047 Rehabilitation Strategy – provides a framework to create a safe, stable, non-polluting and sustainable landscape that achieves the intended final land uses and is consistent with key stakeholder agreed social and environmental values;

- NEC-HSE-PRO-001 Permit to Disturb Procedure – procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance; andMAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring – details the requirements of the monitoring programs for areas of disturbed land rehabilitation, conservation and biodiversity offset and other remnant native vegetation at Mt Arthur Coal.

Weed and Pest Management

Weed management at Mt Arthur Coal (including offset areas) consists of two major programs: the weed assessment program and weed treatment program. Weed treatment was identified as a critical control to manage the risk associated with weed colonisation of rehabilitated areas at Mt Arthur Coal.

The assessment program consists of the periodic inspection of all Mt Arthur Coal owned land (except operational areas such as open cut pits). This supplements data collected during ecological development monitoring. This is in turn supported by regular inspections conducted by Mt Arthur Coal staff and feedback from mining personnel, contractors and lessees to identify areas of weed infestation. A trial using high resolution aerial imagery to assess weeds in rehabilitation areas is currently being undertaken. The treatment program involves the seasonal treatment, mainly through chemical spraying, of the highest priority weed infestations.

The pest control program was identified as a critical control to manage the risk of animal predation on rehabilitation areas. The aim of the vertebrate pest management program is to target wild dogs and foxes that represent a threat to biodiversity values on site (including offset areas) and to adjacent grazing operations. A minimum of one feral animal control program is conducted across Mt Arthur Coal owned land each year, targeting those areas where dogs and foxes have been reported by employees, contractors and landowners. Pest management programs are conducted in accordance with the Pesticide Control Order 2010 (1080 Liquid Concentrate and Bait Products) and, where possible, in conjunction with wider regional control programs. Other pest vertebrate pest management programs conducted include rabbit and hare control, using baits and trapping, and kangaroo harvesting will occur as required.

Relevant BHP and Mt Arthur Coal documents providing detailed management of weeds and pest animals include:

- MAC-HSE-PRO-002 Pest Animal Management Procedure – contains the requirements to monitor pest populations and implement control strategies when required;
- MAC-ENC-PRO-012 Land Management – details requirements of vegetation clearing, topsoil stripping and topsoil stockpiling to ensure activities are undertaken in an environmentally responsible manner and in accordance with statutory requirements and site environmental management plans;
- NEC-HSE-PRO-001 Permit to Disturb Procedure – procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance; and
- MAC-ENC-MTP-050 Biodiversity Management Plan – outlines the biodiversity management and monitoring approach that addresses both State and Commonwealth approval conditions at Mt Arthur Coal.

Bushfire

Specific bushfire prevention and fire suppression control measures are implemented in order to protect remnant vegetation communities as well as Mt Arthur Coal fixed and mobile infrastructure.

Prevention and control measures to reduce the risk of bushfire ignition on Mt Arthur Coal owned land, and to protect the operations from bushfire include fuel load assessment and reduction programs, the establishment and maintenance of fire breaks and the prevention of ignition sources. Fire suppression and control is achieved through on-site firefighting equipment, including a rescue truck and water carts, facilitated by a network of roads and vehicle access trails, which provide access to all areas of Mt Arthur Coal owned land. Mt Arthur Coal also maintains a trained emergency response team on each shift, and fire extinguishers are fitted in all vehicles and buildings.

Relevant BHP and Mt Arthur Coal documents providing detailed management of bushfire include:

- MAC-ENC-PRO-076 Bushfire Prevention Procedure ; and
- MAC-STE-PRO-010 Emergency Procedure – Bushfires.

Unsuitable Geochemical Properties

A geochemical assessment of overburden material, completed as part of the Mt Arthur North Coal Project Environmental Impact Statement (Coal Operations Australia Limited, April 2000), indicated that the non-coal associated rock strata (95% of the overburden to be removed) represented a low risk of acid generation, that no selective handling was required, and that containment of leachate or runoff was not required (for AMD purposes).

Spontaneous combustion at Mt Arthur Coal is predominantly confined to old mining areas in the Bayswater No. 2 and the Maxwell Infrastructure (Drayton) sublease area. This is a result of the higher levels of sulphuric material in the coal seams mined from the Greta measures, compared to those mined in the former Bayswater No. 3 and Mt Arthur North mining areas (Wittingham measures). Management of spontaneous combustion include:

- Monitoring for signs spontaneous combustion;
- Remedial action of spontaneous combustion; and
- Overburden emplacement and coal stockpile designed to minimise Spontaneous combustion potential.

Relevant BHP and Mt Arthur Coal documents providing detailed management of unsuitable geochemical properties and spontaneous combustion include:

- MAC-PRD-STD-003 Design Construction and Maintenance of Dump Areas-– production standard to ensure all productive overburden dumps and coal stockpiles are set out in a safe uniform design, well-constructed and routinely maintained at Mt Arthur Coal. This Procedure as identified as a critical control to manage the risk of hostile materials at/or near the surface impacting upon the success of rehabilitation; and
- MAC-ENC-PRG-002 Spontaneous Combustion Control Program – details the monitoring and control measures implemented to manage spontaneous combustion at Mt Arthur Coal.

Mine Subsidence

Although Mt Arthur Coal is located within the Muswellbrook Mine Subsidence district, there is no recent history of mine subsidence within Mt Arthur Coal mine leases. As a result, subsidence is not predicted to impact on mining or rehabilitation activities within this RMP period.

Other Controls

Management practices for erosion and sedimentation risks are presented in **Section 7.3.4.** Geotechnical controls are presented in **Section 7.3.3**.

7.3.2 Decommissioning

Infrastructure is to be removed unless otherwise approved by the Resources Regulator. The primary risks to rehabilitation associated with infrastructure removal is contamination from hazardous building materials and fuel and chemical storage.

Mt Arthur Coal implements the following practices to mitigate such risks:

- Maintenance of a contaminated sites register
- Maintenance of a hazardous buildings materials register, primarily asbestos
- Prior to removal:
  - Areas are to be assessed for site contamination
  - All areas to be remediated to a standard that is acceptable under NSW State legislation.

Relevant BHP and Mt Arthur Coal documents providing detailed management of hazardous materials and contaminated sites include:

- MAC-ENC-PRO-074 Contaminated Land Management – procedure contains details of how to identify, manage and remove/remediate contaminated land; and

- MAC-STE-PRO-013 Hazardous Materials Management Procedure – safe and appropriate handling, transport and storage of hazardous materials on site.

The decommissioning of tailings facilities will have closure design in accordance with ANCOLD guidelines. Capping/ treatment of facilities will be appropriately designed and constructed so as to ensure geotechnical stability and successful containment of tailings material and hazardous leachate drainage or seepage. The closure of will require sign off from the Dam Safety Committee that TSF wall integrity is satisfactory based on assessment by a suitably qualified geotechnical engineer.

7.3.3 Landform Establishment

An adaptive design approach to wall stability will be applied to the final voids, with experience and learnings gained throughout the mining operation combined with consideration of long term issues such as erosion, surface degradation and effects of stored void water. This approach is particularly suited to the complex structural geology at Mt Arthur Coal, with pit walls continually intersecting various faults and dykes at different angles. It will also allow Mt Arthur Coal to adopt leading practice at the time of closure, for example Probability of Failure (PoF) – a focus of ongoing research and development - as a design criterion, instead of the more deterministic Factor of Safety.

There are two different types of stability that Mt Arthur Coal considers for final voids. Firstly, there is rock mass failure risk that would pose a safety risk to those nearby and could change how the void and adjacent land is used. Secondly, there is erosional stability around the crest of the final void. The coal mining industry is currently funding research to better understand and predict erosion around landforms including final voids. When this work has progressed sufficiently, testing and erosion modelling will be considered to optimise void designs for Mt Arthur.

The geomorphic design method is currently being used on several emplacements across Mt Arthur Coal. The geomorphic design approach uses the characteristics of stable natural alluvial landforms in the local environment as an analogue on which to base the design of overburden landforms. Importantly, the approach does not replicate existing landforms, but rather uses the key characteristics that make these landforms stable in a new design. Natural landforms in alluvial materials are characterised by an integrated network of drainage channel, typically with slopes initially convex close to ridge lines, becoming concave and progressively flattening with increasing catchment area. Not all landforms will feature geomorphic design, as there are places where it may not be practical to implement due to safety, stability, or land use.

While the site has committed to building these new geomorphological based landform designs, it is important to emphasise that the design will require the refinement and optimisation of the landforms as construction experience is obtained at Mt Arthur Coal. This will include evaluating the performance of the rocky materials selected for erosion protection in the drainage lines, revegetation strategies in and around the drainage lines and on the general slopes, and evaluation of the performance of the different soil types in varying slope and catchment area configurations. Monitoring will inform continual improvement of the design including limitations on where it can be implemented. Study of the location and suitability of the design will be made in 2018 to inform where further design will occur.

The geochemical assessment also analysed overburden material for potential sodicity, and determined a moderate to high potential for sodic spoil to be uncovered during mining.

The construction of the final landform design includes the following components:

- on the steeper outer slopes such as MacLeans overburden emplacement area, material will be placed in benches and then dozed into place, while on the upper surface such as for Main overburden emplacement area, the material can be placed and shaped using GPS equipment;
- steeper drainage lines are armoured appropriately, not as a highly engineered drop structures, but rather as an integrated surface in the manner of a typical valley creek; and
- the design approach moves away from specifying maximum slopes, since it is not the steepness of the slope alone that represents an erosion risk, but rather a combination of the catchment area and slope.

BHP's Global AMD Management Standard is a recently developed internal BHP standard that aims to develop a consistent simple, and sustainable global AMD management approach. BHP are in the process of implementing this new Standard across the business completed a gap assessment for Mt Arthur Coal in FY20. Integration of the findings is planned for completion by the end of FY23.

Relevant BHP and Mt Arthur Coal documents providing detailed management of geotechnical and geochemical risk with regards to rehabilitation include:

- MAC-ENC-PRG-002 Spontaneous Combustion Control Program – details the monitoring and control measures implemented to manage spontaneous combustion at Mt Arthur Coal;
- MAC-ENC-PRO-033 Waste Handling and Disposal – details the procedure to be followed for handling, storage and disposal of multiple waste types generated by the operation of Mt Arthur Coal;
- MAC-ENC-PRO-060 Erosion and Sediment Control Plan – procedure to be followed to monitor and manage erosion and sediment across the Mt Arthur Coal site;
- MAC-ENC-PRO-061 Surface Water Monitoring Program – outlines the surface water monitoring required to ensure regulatory compliance and minimise environmental impacts;
- MAC-ENC-PRO-062 Groundwater Monitoring Program – outlines the groundwater monitoring required to ensure regulatory compliance and minimise environmental impacts;
- MAC-ENC-PRO-074 Contaminated Land Management – procedure contains details of how to identify, manage and remove/remediate contaminated land;
- MAC-PRD-STD-003 Design Construction and Maintenance of Dump Areas – production standard to ensure all productive overburden dumps and coal stockpiles are set out in a safe uniform design, well-constructed and routinely maintained at Mt Arthur Coal. All coal-associated overburden (and coarse rejects) requires selective handling and co-disposal relying on the buffering capacity of waste rock to mitigate any potentially acid forming materials;
- Mt Arthur Coal Final Void Management Plan – outlines Mt Arthur Coal's approach to the critical issues affecting final voids;
- BHP Coal Rehabilitation Manual – describes methods to achieve satisfactory rehabilitation and provides a framework for all rehabilitation activities after final placement and reshaping of the underlying landform; and
- BHP Coal Landform Design Guidelines – design guidance for placement and slope angles of material including topsoil, different classifications of rock, carbonaceous material, and material with acid mine drainage potential.

7.3.4 Growth Medium Development

Erosion and Sediment Control

The primary site-wide management measures for erosion and sediment is the control of initial ground disturbance and timely land rehabilitation following disturbance. With regards to rehabilitation planning, the primary erosion control is rapid establishment of a vegetative cover. To achieve this, rapidly establishing sterile cover crop species are included in both the pasture and native vegetation seed mixes. These species (Shirohie Millet in Summer and Coolibah Oats in Winter) provide initial erosion control via establishment of a surface vegetative cover and subsurface root system, which remains even after the grass has died off, allowing the slower growing but more permanent plant species to emerge. Due to ongoing drought conditions limiting growth of ground cover temporary stabilisation using mulch across placed topsoil is being trialled. A seed mix update will also be trailed using native species that establish in disturbed areas such as species of salt bush (refer to Section 10).

Reshaped emplacement slopes also incorporate appropriate surface run-off management structures to reduce erosion potential until adequate vegetation cover is established. These structures generally consist of contour drains, mulching and rock placement. Sediment ponds, designed in accordance with the Managing Urban Stormwater Guidelines (Landcom (2004) [Blue Book]), are integrated into landform drainage plans to intercept and reduce sediment load from surface runoff until rehabilitation is established.

Relevant BHP and Mt Arthur Coal documents providing detailed management of erosion and include:

- MAC-ENC-PRO-012 Land Management Procedure – details requirements of vegetation clearing, topsoil stripping and topsoil stockpiling to ensure activities are undertaken in an environmentally responsible manner and in accordance with statutory requirements and site environmental management plans;
- MAC-ENC-PRO-060 Erosion and Sediment Control Plan – procedure to be followed to monitor and manage erosion and sediment across the Mt Arthur Coal site; and

- BHP Coal Rehabilitation Manual – describes methods to achieve satisfactory rehabilitation and provides a framework for all rehabilitation activities after final placement and reshaping of the underlying landform.

Topsoil Management

A pre-rehabilitation topsoil stockpile inspection and testing program has also been implemented to characterise stockpiled material, identify suitability for the specific proposed rehabilitation, and identify any requirement for soil ameliorants such as gypsum.

Topsoil is sourced from nearby stockpiles, or directly placed from stripping operations. Due to the age and variable quality of stockpiled soil, it is tested before placement to determine suitability and identify amelioration requirements. The material is then placed and spread to an approximate depth of 150 - 300 millimetres. Ameliorants (i.e. gypsum), if required, are applied and integrated, and the topsoil surface is contour cultivated prior to seeding to provide suitable micro-environments that shelters seed and encourages water infiltration. The landscape being constructed will also include extensive use of trees and rock scarp for visual relief.

Relevant BHP and Mt Arthur Coal documents providing detailed management of topsoil include:

- MAC-ENC-PRO-012 Land Management Procedure - details requirements of vegetation clearing, topsoil stripping and topsoil stockpiling to ensure activities are undertaken in an environmentally responsible manner and in accordance with statutory requirements and site environmental management plans;
- NEC-HSE-PRO-001 Permit to Disturb Procedure - procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance. This Procedure was identified as a critical control to manage the following topsoil risks in the growth medium development phase:
    - Existing topsoil contamination/loss of quality; and
    - Failure to characterise soils for use in rehabilitation.
- BHP Coal Rehabilitation Manual - describes methods to achieve satisfactory rehabilitation and provides a framework for all rehabilitation activities after final placement and reshaping of the underlying landform.

In addition, Mt Arthur Coal are currently preparing a Topsoil Management Plan which will outline the requirements for topsoil pre-stripping, characterisation, handling, storage and placement during active mining and rehabilitation phases.

7.3.5 Ecosystem and Land Use Establishment

Native Flora and Fauna

Mt Arthur Coal has a management strategy in place to manage or mitigate mining impacts on native flora, fauna and habitat in the vicinity of operational mining areas. Pre-project ecological assessments and control of disturbance during vegetation clearing are the main protection measures.

From a rehabilitation planning perspective, the major strategies are to ensure that, in accordance with the Mt Arthur Coal EPBC Approval (EPBC 2011/5866) and Project Approval 09_0062 MOD 1, rehabilitation planning incorporates the return of:

- 500 ha of box-gum grassy woodland/ winter bird habitat; and
- An additional 2142 ha of woody native vegetation community.

To meet the requirements of the Project Approval 09_0062 MOD 1, rehabilitated woody vegetation communities are also to focus on the re-establishment of:

- significant and/or threatened plant communities, including:
  - Upper Hunter White Box – Ironbark Grassy Woodland;
  - Central Hunter Box – Ironbark Woodland;
  - Central Hunter Ironbark – Spotted Grey-Gum Box Forest;

  - Narrabeen Footslopes Slaty Box Woodland;
  - Hunter Floodplain Red Gum Woodland Complex;
  - White Box Yellow Box Blakely's Red Gum Forest;
  - Hunter Lowlands Red Gum Forest; and
- habitat for significant and/or threatened animal species.

Re-establishing, or increasing, the habitat value of rehabilitated woodland vegetation communities, by the placement of recovered habitat features such as hollow-bearing logs, large wooden debris and rocks will be a key rehabilitation initiative. Large surface rocks raked clear during overburden emplacement rehabilitation will be placed in piles as habitat features amongst or adjacent to remnant vegetation where possible.

Mt Arthur Coal has an integrated ecological and rehabilitation monitoring program which, as well as assessing mining impact on nearby remnant native vegetation, also assesses the ecological development of rehabilitation areas against the remnant communities and rehabilitation progress criteria. This program is discussed further in Section 0.

Relevant BHP and Mt Arthur Coal documents providing detailed management of native flora and fauna include:

- MAC-ENC-MTP-050 Biodiversity Management Plan – outlines the biodiversity management and monitoring approach that addresses both State and Commonwealth approval conditions at Mt Arthur Coal;
- MAC-ENC-MTP-047 Rehabilitation Strategy – provides a framework to create a safe, stable, non-polluting and sustainable landscape that achieves the intended final land uses and is consistent with key stakeholder agreed social and environmental values ;
- MAC-HSE-PRO-002 Pest Animal Management Procedure – contains the requirements to monitor pest populations and implement control strategies when required;
- MAC-ENC-PRO-012 Land Management – details requirements of vegetation clearing, topsoil stripping and topsoil stockpiling to ensure activities are undertaken in an environmentally responsible manner and in accordance with statutory requirements and site environmental management plans;
- NEC-HSE-PRO-001 Permit to Disturb Procedure – procedure defining the process for authorising a change in land use (either temporary or permanent) to minimise the potential for environmental harm and ensure compliance;
- MAC-ENC-PRO-076 Bushfire Prevention Procedure; and
- MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring – details the requirements of the monitoring programs for areas of disturbed land rehabilitation, conservation and biodiversity offset and other remnant native vegetation.

Ecological monitoring in accordance with MAC-ENC-PRO-080 Rehabilitation and Ecological Monitoring was identified as a critical control to demonstrate that the structure and function of the ecosystem has been achieved in this rehabilitation phase, and to identify if a rehabilitation area is able to be signed off. Mt Arthur Coal will regularly review the monitoring undertaken (see Section 9) to ensure it remains in line with any changes to rehabilitation objectives, performance indicators and completion criteria (Table 5 and Table 6).

Seed Mix and Tube Stock

Native vegetation seed mixes have been adopted that target the re-establishment of the required ironbark-box-gum communities. Tubestock planting programs also target the establishment of box-gum woodland and fauna habitat. Biodiversity and habitat values within woody rehabilitation areas are also enhanced by the incorporation of habitat structures such as nesting/roosting boxes, hollow bearing trees recovered during vegetation clearing, woody debris and rock piles. The diversity of structure improves the potential biodiversity capability.

The native woodland vegetation seeded before July 2012 was a generic native tree and shrub mix based on species common to native vegetation communities of the Upper Hunter Valley floor. Following consultation with ecological consultants, the seed mix used to establish woodland rehabilitation at Mt Arthur Coal was modified during 2013 and more recently in 2018 to better reflect the species composition of Upper Hunter White Box – Ironbark Grassy Woodland. This seed mix was also modified to include mainly native grass species, along with a sterile exotic cover crop, for groundcover. Mt Arthur Coal is conducting trials into mulit-pass seeding, focussing on

cover crop and early coloniser species in the initial seeding pass with follow up seeding and tubestock of upper and mid storey species. This is to ensure that a valuable resource isn't wasted due to adverse conditions.

In the past, pasture rehabilitation has largely been established by broadcast seeding of a pasture seed mix, based heavily on exotic grass species such as rhodes grass (*Chloris gayana*), kikuyu (*Pennisetum clandestinum*) and green panic (*Panicum maximum*). The actual composition of the pasture seed mix has varied substantially, with the most significant change being the reduction and eventual removal of rhodes grass due to its observed dominance in pasture rehabilitation.

The major modification to rehabilitation method across all domains is the change in vegetation establishment to encourage the development of specific box gum woodland communities.

Species used for developing seed mixes each year are presented in **Table 11** to **Table 13**. Species selected may vary year to year based on availability, characteristics of the landform to be established and based on trials of different phases of seeding (refer to Section 10 for more information on phased seeding). Acronyms presented in **Table 12** and **Table 13** are described in **Table 14.**

Table 11 Mt Arthur Coal pasture seed mix

Common name	Species name	Seed mix kg/ha
Couch	*Cynodon dactylon*	10
Lucerne	*Medicago Sativa*	3
Green Panic	*Panicum Coloratum*	3
Seaton Park Sub-clover	*Trifolium Subterranean*	3
Haifa White Clover	*Trifolium Repens*	3
Kikuyu	*Pennisetum Clandestinum*	3
Wimmera Rye	*Lolium Rigidum*	7
Perennial Rye	*Lolium Perenne*	7
Phalaris	*Phalaris Aquatica*	5
Shirohie Millet (summer)	*Echinochloa Esculenta*	10
Oats (winter)	*Avena Sativa*	10

Table 12 Mt Arthur Coal native woodland species list

Species and Category	Common name	Features
Trees		
Allocasuarina luehmannii	Buloke	EC
Angophora floribunda	Rough barked apple	LT
Brachychiton populneus	Kurrajong	LT
Eucalyptus albens	White Box	LT
Eucalyptus blakelyi	Blakely's Red Gum	LT
Eucalyptus camaldulensis	River red gum	LT
Eucalyptus crebra	Narrow-leaved Ironbark	LT
Eucalyptus fibrosa	Broad-leaved Ironbark	LT
Eucalyptus maculata	Spotted gum	LT
Eucalyptus moluccana	Grey Box	LT
Eucalyptus punctata	Grey gum	LT
Eucalyptus tereticornis	Forest red gum	LT

Species and Category	Common name	Features
Indicative kg/ha: 1		
Shrubs		
Acacia amblygona	Fan Wattle	NF
Acacia decora	Western silver wattle	NF, EC
Acacia falcata	Sickle Wattle	NF, EC
Acacia longifolia	Golden wattle	NF, EC, SL
Acacia paradoxa	Kangaroo thorn	NF, EC
Acacia parvipinnula	Silver stemmed wattle	NF, EC
Acacia salicina	Cooba	NF, EC
Breynia oblongifolia	Coffee Bush	LT
Bursaria spinosa	Blackthorn	EC
Cassinia arcuata	Sifton bush	EC
Daviesia ulicifolia* subsp. *ulicifolia	Gorse Bitter Pea	NF
Dodonaea viscosa	Sticky Hop-bush	LT
Hakea sericea	Needle Hakea	LT
Hibbertia obtusifolia	Hoary Guinea Flower	SL
Indigofera australis	Australian Indigo	NF
Lissanthe strigosa	Peach Heath	LT
Myoporum montanum	Western Boobialla	EC
Notelaea microcarpa* var. *microcarpa	Native olive	LT
Ozothamnus diosmifolius	Dogwood	SL
Psydrax odorata	Shiny-leaved Canthium	LT
Pultenaea spinosa	Grey Bush Pea	NF
Sclerolaena birchii	Galvanised Burr	EC
Sclerolaena muricata	Black Roly Poly	EC
Indicative kg/ha: 2.5		
Groundcover (non-grasses)		
Arthropodium milleflorum		LT
Ajuga australis	Austral Bugle	LT
Asperula conferta	Common Woodruff	LT
Brunoniella australis	Blue Trumpet	LT
Calotis cuneifolia	Purple Burr-daisy	SL
Calotis lappulacea	Yellow Burr-daisy	SL
Chrysocephalum apiculatum	Common Everlasting	SL
Carex inversa	Knob Sedge	SL
Cyperus gracilis	Slender Flat-sedge	SL
Desmodium varians	Slender Tick-trefoil	NF
Dianella longifolia	Blueberry Lily	LT
Dianella revoluta	Blueberry Lily	LT
Dichondra repens	Kidney Weed	LT
Einadia nutans	Climbing Saltbush	EC
Eremophila debilis	Winter Apple	LT
Glossocardia bidens	Cobbler's Tack	SL

Species and Category	Common name	Features
Goodenia hederacea* subsp. *hederacea	Forest Goodenia	LT
Glycine clandestina	Twining Glycine	NF
Glycine microphylla	Small-leaf Glycine	NF
Glycine tabacina		NF
Euchiton sphaericus		LT
Hardenbergia violacea	Purple Coral Pea	NF
Hypericum gramineum	Native St John's Wort	LTST
Laxmannia gracilis	Slender Wire Lily	LT
Lobelia purpurascens	Whiteroot	LTST
Lomandra filiformis	Wattle Mat-rush	LT
Lomandra multiflora	Mat Rush	LT
Opercularia diphylla		LTST
Oxytes brachypoda	Large Tick-trefoil	NF
Phyllanthus virgatus		LT
Sida corrugata	Corrugated Sida	LT
Solanum cinereum	Narrawa Burr	EC
Solanum prinophyllum	Forest Nightshade	LTST
Stackhousia viminea	Slender Stackhousia	LT
Phyllanthus virgatus	Leafy Templetonia	LT
Vittadinia cuneata	Fuzzweed	EC, SL
Wahlenbergia gracilis	Sprawling Bluebell	EC, SL
Wahlenbergia communis	Tufted Bluebell	EC, SL
Veronica plebeia	Trailing Speedwell	LTST
Zornia dyctiocarpa		LT
Indicative kg/ha: 1.5		
Groundcover grasses - indicative only		
Aristida ramosa	Purple Wire Grass	EC/LT
Aristida vagans	Threeawn Grass	LTST
Austrodanthonia spp.	Wallaby grasses	
Austrostipa scabra	Rough spear grass	
Austrostipa verticillata	Slender bamboo grass	LTST
Bothriochloa decipiens* var. *decipiens	Pitted Bluegrass	EC
Bothriochloa macra	Redleg Grass	EC
Chloris truncata	Windmill grass	EC
Chloris ventricosa	Plump Windmill Grass	EC/LT
Cymbopogon refractus	Barbed wire grass	EC/LT
Dichanthium sericeum	Queensland bluegrass	EC
Dichelachne micrantha	Short Hair Plume Grass	LT
Digitaria ramularis		LT
Echinopogon caespitosus* var. *caespitosus	Tufted Hedgehog Grass	LTST
Echinopogon ovatus	Forest Hedgehog Grass	LTST

Species and Category	Common name	Features
Entolasia marginata	Bordered Panic	LTST
Entolasia stricta	Wiry Panic	LT
Elymus scaber	Common wheat grass	LT
Eragrostis brownii	Brown's Lovegrass	SL
Eragrostis leptostachya	Paddock Lovegrass	LT
Microlaena stipoides* var. *stipoides	Weeping grass	EC, LTST
Oplismenus aemulus	Basket Grass	LTST
Panicum effusum	Hairy panic	EC
Paspalidium distans		EC
Poa sieberiana	Snowgrass	EC/LT
Poa labillardierei* var. *labillardierei	Tussock Grass	LTST
Rytidosperma bipartitum	Wallaby Grass	LT
Rytidosperma racemosa	Wallaby Grass	LT
Sporobolus creber	Slender Rat's Tail Grass	EC/LT
Sporobolus elongatus	Slender Rat's Tail Grass	EC/LT
Themeda australis	Kangaroo Grass	EC/LT
Indicative kg/ha: 12		
Cover Crop/First Phase		
Avena sativa	Coolabah Oats	
Echinochloa esculenta	Japanese Millet	
Native Alternatives/Additions for Cover Crop		
Chloris truncata	Windmill Grass	
Microlaena stipoides* var. *stipoides	Weeping Grass	
Indicative kg/ha: up to 100		

Table 13 Mt Arthur Coal box gum woodland species list

Species and Category	Common name	Features
Trees		
Brachychiton populneus	Kurrajong	LT
Eucalyptus albens	White Box	LT
Eucalyptus blakelyi	Blakely's Red Gum	LT
Eucalyptus crebra	Narrow-leaved Ironbark	LT
Eucalyptus moluccana	Grey Box	LT
Eucalyptus melliodora	Yellow Box	LT
Eucalyptus albens x moluccana	White Box - Grey Box Intergrade	LT
Indicative kg/ha: 1		
Shrubs		
Acacia decora	Western silver wattle	NF
Acacia falcata	Sickle wattle	NF, EC
Acacia implexa	Hickory Wattle	NF, EC
Acacia paradoxa	Kangaroo thorn	NF, EC
Acacia parvipinnula	Silver stemmed wattle	NF, EC
Bursaria spinosa	Blackthorn	EC

Species and Category	Common name	Features
Cassinia arcuata	Sifton bush	EC
Dodonaea viscosa	Sticky Hop-bush	
Olearia viscidula		
Maireana microphylla	Bluebush	EC
Sclerolaena birchii	Galvanised Burr	EC
Sclerolaena muricata	Black Roly Poly	EC
Indicative kg/ha: 2.5		
Groundcover (non-grasses)		
Ajuga australis	Austral Bugle	
Asperula conferta	Common Woodruff	
Boerhavia dominii	Tarvine	
Brunoniella australis	Blue Trumpet	
Carex inversa	Knob Sedge	
Calotis lappulacea	Yellow Burr-daisy	SL
Chrysocephalum apiculatum	Common Everlasting	SL
Cyperus gracilis	Slender Flat-sedge	SL
Desmodium varians	Slender Tick-trefoil	NF
Dichondra repens	Kidney Weed	
Dianella longifolia	Blueberry Lily	
Dianella revoluta	Blueberry Lily	
Einadia nutans	Climbing Saltbush	EC
Eremophila debilis	Winter Apple	
Glycine clandestina	Twining Glycine	NF
Glycine microphylla	Small-leaf Glycine	NF
Glycine tabacina		NF
Geranium solanderi	Native Geranium	LTST
Lomandra filiformis	Wattle Mat-rush	
Lomandra multiflora	Mat Rush	
Phyllanthus virgatus		
Plantago debilis		LTST
Plantago gaudichaudii	Narrow Plantain	LTST
Oxalis perennans		
Oxytes brachypoda	Large Tick-trefoil	NF
Rostellularia adscendens		LTST
Sida corrugata	Corrugated Sida	
Stackhousia viminea	Slender Stackhousia	
Solanum cinereum	Narrawa Burr	EC
Swainsona galegifolia	Smooth Darling Pea	NF, LTST
Templetonia stenophylla	Leafy Templetonia	NF
Vittadinia cuneata	Fuzzweed	EC
Wahlenbergia communis	Tufted Bluebell	EC
Indicative kg/ha: 1.5		
Groundcover grasses - indicative only		
Aristida ramosa	Purple Wire Grass	EC

Species and Category	Common name	Features
Aristida vagans	Threeawn Grass	LTST
Austrostipa scabra	Rough spear grass	EC
Austrostipa verticillata	Slender bamboo grass	LTST
Bothriochloa decipiens* var. *decipiens	Pitted Blue Grass	EC
Bothriochloa macra	Redleg Grass	EC
Chloris truncata	Windmill grass	EC
Chloris ventricosa	Plump Windmill Grass	EC/LT
Cymbopogon refractus	Barbed wire grass	EC/LT
Dichanthium sericeum	Queensland bluegrass	EC
Dichelachne micrantha	Short Hair Plume Grass	LT
Digitaria diffusa	Open Summer Grass	LT
Digitaria brownii	Cotton Panic Grass	LT
Digitaria ramularis		LT
Elymus scaber	Common wheat grass	LT
Eragrostis brownii	Brown's Lovegrass	SL
Eragrostis leptostachya	Paddock Lovegrass	LT
Microlaena stipoides* var. *stipoides	Weeping grass	EC, LTST
Panicum effusum	Hairy panic	EC
Poa sieberiana	Snowgrass	EC/LT
Poa labillardierei* var. *labillardierei	Tussock Grass	LTST
Rytidosperma bipartitum	Wallaby Grass	LT
Rytidosperma racemosa	Wallaby Grass	LT
Sporobolus creber	Slender Rat's Tail Grass	EC/LT
Sporobolus elongatus	Slender Rat's Tail Grass	EC/LT
Themeda australis	Kangaroo Grass	EC/LT
Indicative kg/ha: 12		
Cover Crop/First Phase		
Exotic (Sterile)		
Avena sativa	Coolabah Oats	X
Echinochloa esculenta	Shirohie millet	X
Native Alternatives/Additions for Cover Crop		
Chloris truncata	Windmill Grass	X
Microlaena stipoides* var. *stipoides	Weeping Grass	X
Indicative kg/ha: up to 100		

Table 14 Woodland species feature key.

KEY	
NF	Nitrogen Fixer
EC	Early Colonisers/Pioneer Species

KEY	
SL	Short Lived
LT	Long Term
LTST	Long Term Shade Tolerant

7.3.6 Ecosystem and Land Use Development

Ecosystem and Land Use Development management practices align closely Ecosystem and Land Use Establishment practices. Work is focused on remedial action based on monitoring results (see **Section 9**) and aligned with responses outlined in the TARP in **Section 11**. The Rehabilitation and Ecological Monitoring Program was identified as a critical control to identify any failing areas of vegetation establishment so the TARP can be triggered.

Weed treatment was considered a critical control to manage the risk of weed colonisation, as was pest control to manage the risk of animal predation in rehabilitated areas. Weed and pest management undertaken during the active mining phase (discussed in **Section 7.3.1**) will be continued into the ecosystem and land use development phase.

7.3.7 Rehabilitation Completion

The final phase of rehabilitation is rehabilitation completion, where all approved rehabilitation objectives and completion criteria for the Final Land Use are met.

The development of rehabilitation objectives for each of the above phases was determined to be a critical control to demonstrate rehabilitation completion. The development of rehabilitation objectives and completion criteria are also a critical control to reduce the risk of conflicting opinions on whether the rehabilitation is successful as there are defined thresholds to be met which have been established using ACARP and other industry-led and publicly available research.

. It is proposed to create a matrix/dashboard to track progression of rehabilitated areas to the next phase as rehabilitation objectives are met.

8. Rehabilitation Quality Assurance Process

The monitoring program requirements will be audited as part of BHPs Assurance Audit Program against the BHP Our Requirements for Closure and Our Requirements for Environment and Climate Change. Rehabilitation will also form part of the Project Approval 09_0062 MOD 1 Schedule 5 Condition 9.

The performance of rehabilitation will be reviewed as part of the Annual Review as per Project Approval 09_0062 MOD 1 Schedule 5 Condition 3. The monitoring program will subsequently be reviewed as per Project Approval 09_0062 MOD 1 Schedule 5 Condition 4.

Field monitoring programs will be supervised by a dedicated Rehabilitation Specialist to ensure they are being undertaken in accordance with this procedure and the Mt Arthur Coal Health and Safety System.

Routine inspections of the rehabilitation will be undertaken by the Rehabilitation Specialist based on any concerns or work being completed. These Rapid Inspection Walkovers identify:

- Erosion and landform stability issues;
- Weed infestation; and
- Failure of target vegetation.

Visual impact inspections to review visual amenity impacts are completed annually to identify issues with:

- Surface vegetation; and
- Screening.

The following are additional quality assurance practices in the Mt Arthur Coal:

- Mt Arthur Coal maintains a topsoil stockpile database;
- Bulk shaping will be completed by GPS enabled dozers;
- Dumps for rehabilitation are verified compliant to design by the use of LIDAR; and
- Supplied seed will be verified for viability species.

9. Rehabilitation Monitoring Program

9.1 Rehabilitation Monitoring

Mt Arthur Coal rehabilitation monitoring programs have been implemented to achieve the following objectives:

- assess the condition and development of rehabilitated/regenerated vegetation;
- assess the stability of land surface, landforms and related engineering structures;
- allow for the comparison of rehabilitated/regenerated areas with relevant baseline information, reference sites;
- progress indicators and completion criteria as listed in the Mt Arthur Coal Rehabilitation Management Plan (RMP);
- identify requirements for maintenance or remedial treatment; and
- meet statutory and corporate requirements relating to rehabilitation and ecological monitoring.

The following monitoring programs have been implemented, at Mt Arthur Coal as part of the Rehabilitation and Ecological Monitoring Procedure (REMP):

- Rehabilitation Completion;
- Landform Stability and Rapid Assessment Walkover;
- Revegetation Inspections;
- Ecological Development;
- Visual Amenity Monitoring; and
- Grazing Potential and Pasture Assessment.

The rehabilitation monitoring program will be reviewed regularly to ensure that sufficient parameters are included to validate completion criteria in Table 5 and Table 6.

9.1.1 Rehabilitation Completion monitoring

Rehabilitation completion monitoring is undertaken during rehabilitation projects to ensure the rehabilitation method used to complete the rehabilitation is recorded, and meets the standards adopted by Mt Arthur Coal. The monitoring requires the rehabilitation contractor and Mt Arthur Coal representative to inspect the works after each key phase and sign-off that the completed work meets the specifications for rehabilitation included in the contract. A Rehabilitation Completion Form is completed to show compliance.

9.1.2 Landform Stability and Rapid Assessment Walkover

Landform stability monitoring program consists of an inspection regime or remote sensing analysis for developing and established rehabilitated areas to monitor long-term stability of rehabilitated and modified natural lands. The aim of this program is to:

- Prove that post-mining landforms are vegetated, relatively stable and represent minimal risk of failure and verify completion criteria with regards to landform stability;
- Identify areas of significant active erosion across Mt Arthur Coal site (except operational and infrastructure areas), and evaluate potential for environmental impact; and
- Determine the requirement for maintenance, remedial treatment or modification of rehabilitation measures.

The monitoring program consists of the completion of an annual desktop review of latest aerial photography to identify potential areas of concern and periodic field walkovers to identify, photograph and determine corrective actions.

9.1.3 Revegetation Inspection

The intent of revegetation inspections is to assess actively revegetated areas to assess the germination of seed, survival and establishment of tubestock, identify potential issues (i.e. poor germination rates, tubestock mortality or predation, water stress or weed infestation) and identify any requirement for maintenance or remedial management.

The monitoring program consists of the completion of a Revegetation Inspection Form by a suitably qualified and experienced person to determine if the rehabilitation can progress from the Ecosystem and Land Use Establishment Phase to the Ecosystem and Land Use Development Phase

9.1.4 Ecological Development Monitoring

The ecological development monitoring program consists of an annual Vegetation Community Assessment and Fauna Survey in order to:

- Prove that areas designated as providing biodiversity value in the post-mining landscape are trending towards the selected vegetation community composition and structure as described in completion criteria; and
- Identify requirement for maintenance activities, remedial action, or modification to rehabilitation, regeneration or land management programs.

9.1.5 Visual Amenity Monitoring

Mt Arthur Coal has a number of overburden emplacement areas which can be viewed from surrounding locations adjacent to the Mt Arthur Coal complex. The monitoring program consists of an annual inspection of six viewpoints surrounding Mt Arthur Coal with a photo to be taken and the completion of the Visual Assessment Checklist. Monitoring of the overburden emplacement areas will ensure any mitigation measures are implemented to maintain compliance against modelled predictions.

9.1.6 Grazing Potential and Pasture Assessment

The Grazing Potential and Pasture Assessment program consists of a Ground and Pasture Assessment and Grazing Suitability Review across areas of pasture rehabilitation and buffer land that are designated as potential post-mining grazing areas. The aims of the program are to show that proposed grazing pasture displays the landscape, soil and pasture characteristics suitable for supporting sustainable beef cattle grazing, and identify maintenance and remedial requirements that would further improve grazing potential.

9.2 Measuring Performance

Discussion on performance is provided in the Annual Review (formerly Annual Environmental Management Review, AEMR). The Annual Review is the reporting mechanism for rehabilitation and is available on the website.

Improvement to the monitoring program going forward will include investigation into use of remote sensing and implementation of inspection test plans.

10. Research, Rehabilitation Trials and Use of Analogue Sites

10.1 Research

A Mt Arthur Coal Final Void Management Plan has been prepared to better understand the options available for residual voids at closure and the benefits that could be available to communities or the environment. This work has complemented the NSWMC void work that is currently underway and has been communicated to the Resources Regulator and community. The Plan outlines Mt Arthur Coal's approach to the critical issues affecting final voids. As required by the Rehabilitation Strategy, this Plan will be regularly updated over the life of the mine as part of the closure planning process, including when new information is received, when the mine plan changes, studies have been completed and following consultation with stakeholders.

Study continues into additional areas for woodland across the site and these areas will tie into the existing woodland corridors. The focus of this work is to align woodlands with areas that would not be as suitable for grazing, for example steep or rocky areas and waterways.

10.1.1 Acid Mine Drainage Standard

BHP's Global AMD Management Standard is a recently released internal BHP standard that aims to develop a consistent simple, and sustainable global AMD management approach. BHP are in the process of implementing this new Standard across the business and have undertaken a preliminary risk assessment to characterise sources of AMD and identify hazards to manage closure risk at each site.

Spoil piles and pit walls were classified as unlikely to generate AMD at Mt Arthur Coal, with coarse rejects piles and pit floors classified as probably/likely for AMD generation. As discussed in Section 7.3.1, waste rock is co-disposed creating a buffering capacity to mimimise the risk of AMD generation Based on the worse-case geochemical hazard and likelihood rating, the tailings and, by extension, the tailings storage facilities, represent the highest closure risk for MAC, being classified as highly likely to generate AMD. The MAC-PRD-STD-003 Design, Construction and Maintenance of Dump Areas standard will continue to be implemented to manage this risk.

10.1.2 Creek Diversions

Work will be commenced in FY20 for developing creek diversion, reinstatement and realignments to better understand:

- Incorporation of erosion control measures based on vegetation and engineering;
- incorporation of structures for aquatic habitat (including geomorphic and vegetation); and
- revegetate with suitable native species.
- As stated in the BIOMP Mt Arthur Coal will:
  - define a process for decision making on the approach for creek reinstatement (using the current mine plan),
  - develop a set of creek design principles; and
  - develop further designs for creek reinstatement, revegetation and replacement.

The Conceptual Fairford Creek Reinstatement Plan was submitted to the DPIE in 2020. This Plan outlines the background topography, hydrology, geomorphology and ecology of the natural Fairford Creek and similar creeks to assist in developing principals and objectives for the design of the Fairford Creek reinstatement. The Plan supports the Initiation Phase of the design process and the conception implementation of the reinstatement. The final planning will form part of a future Forward Plan and will include performance and completion criteria.

10.1.3 Species list

Mt Arthur Coal continually reviews and updates the applied seed mix listed in **Table 11, Table 12** and **Table 13** to increase success of rehabilitation. The objectives of these ongoing updates include:

- Staged application of seed to mimic natural ecological development;
- Utilising the properties of species to help with growth medium development;
- Utilising the properties of species to species diversity by ensuring niches within the landscape are filled as they develop;
- Utilise early colonisers to increase early colonisers to ameliorate and stabilise soils; and
- Identification of species showing increased success from seeding to focus resources to these species and allow for planning of infill planting.

10.1.4 Monitoring

Mt Arthur Coal is currently investigating the use of remote sensing to replace and enhance field inspections. Currently Mt Arthur Coal is undertaking a trial using high resolution aerial imagery to quantitatively determine weed populations and enable improved weed treatment practices.

In addition to weed monitoring remote sensing will be used to assess:

- Vegetation health;
- Ground cover;
- Vegetation mix; and
- Erosion rates.

As discussed in **Section 9**, rehabilitation monitoring at Mt Arthur Coal is undertaken in accordance with the REMP. The REMP will be updated to capture the use of remote sensing, along with weed monitoring and soil sampling practices currently utilised at site.

10.1.5 Rehabilitation Risk Assessment

Mt Arthur Coal commissioned an independent expert to facilitate an update of the Rehabilitation Risk Assessment as part of this RMP update. This process included an independent landform design engineer and relevant stakeholders across the business. Some additional controls to manage risk, along with some opportunities to improve existing risk controls were identified as part of this process. Mt Arthur Coal are currently developing an action plan to address these improvements in FY22.

10.1.6 Weather Forecasting and Inclusion in Rehabilitation Planning

Undertaking rehabilitation in favourable weather conditions could lead to improved success rate of vegetation establishment and development. Mt Arthur Coal are planning to investigate the use of weather modelling to assist in rehabilitation planning.

10.1.7 Landscape Evolution Model

A review of the legacy rehabilitation areas is proposed by Mt Arthur Coal to determine any risks associated with long-term stability. Should any legacy rehabilitation areas be identified as a risk, they will be included in the development of a Landscape Evolution Model. This model will also be used to inform geomorphic landform design for future rehabilitation areas, along with stress testing potential climate change impacts. The initial assessment and scoping of the Landscape Evolution Model will be undertaken in FY22.

10.1.8 Topsoil Balance

Following a recommendation in the Independent Environmental Audit completed in early 2021 Mt Arthur developed MAC-ENC-MTP-053 Topsoil Management Plan. Currently the focus of this document is to provide guidance on

- Define roles and responsibilities in topsoil management;
- Topsoil stripping requirements;

- Topsoil stockpiling and maintenance of stockpiles;
- Topsoil sampling and analysis requirements; and
- Selective placement of topsoil in rehabilitation areas.

Based on current disturbance and topsoil volumes in stockpiles Mt Arthur has a topsoil deficit. Current controls to manage the risk of insufficient topsoil to achieve relinquishment at include utilising topsoil in pasture areas only, utilising alternative growth media and importing topsoil. Mt Arthur will further refine the Topsoil Balance across the life of the mine. This will include a desktop study to assess data gaps, field work to review stripping depths and more detailed topsoil and alternative growth media usage scenarios to facilitate closure.

10.2 Rehabilitation Trials

Further field trials into the establishment of box gum grassy woodlands (especially groundcover and understoreys) in existing pasture rehabilitation have been developed. These trials will specifically investigate methods to reduce the dominance of exotic grass species, increase the proportion of native grass species, and control weed proliferation, when modifying existing pasture rehabilitation. Where possible Mt Arthur Coal will also look to utilise the results of other research initiatives completed in the Hunter Valley to help develop and inform establishment of box gum woodland.

Grazing trials on rehabilitated land south of MacDonalds Pit will continue, with a reference site established on adjacent non-mined grazing land. This trial area originally formed part of an industry-wide rehabilitation grazing trial being coordinated by NSW Mining, as part of the Upper Hunter Mining Dialogue. Grazing of cattle on this land is now undertaken by a lessee.

Mulch will be trialled as a temporary erosion control measure while in the ecosystem establishment phase. Coarse compost has been trialled as a temporary erosion control measure in 2021, and hay mulch will also be trialled in the future as another alternative.

Monitoring of the rehabilitation progress through the rehabilitation phases has been ongoing at Mt Arthur Coal. The Monitoring is proposed to be increased and expanded as the rehabilitation increases across site. Mt Arthur Coal is working with a consultant to update and improve the monitoring program across Mt Arthur Coal.

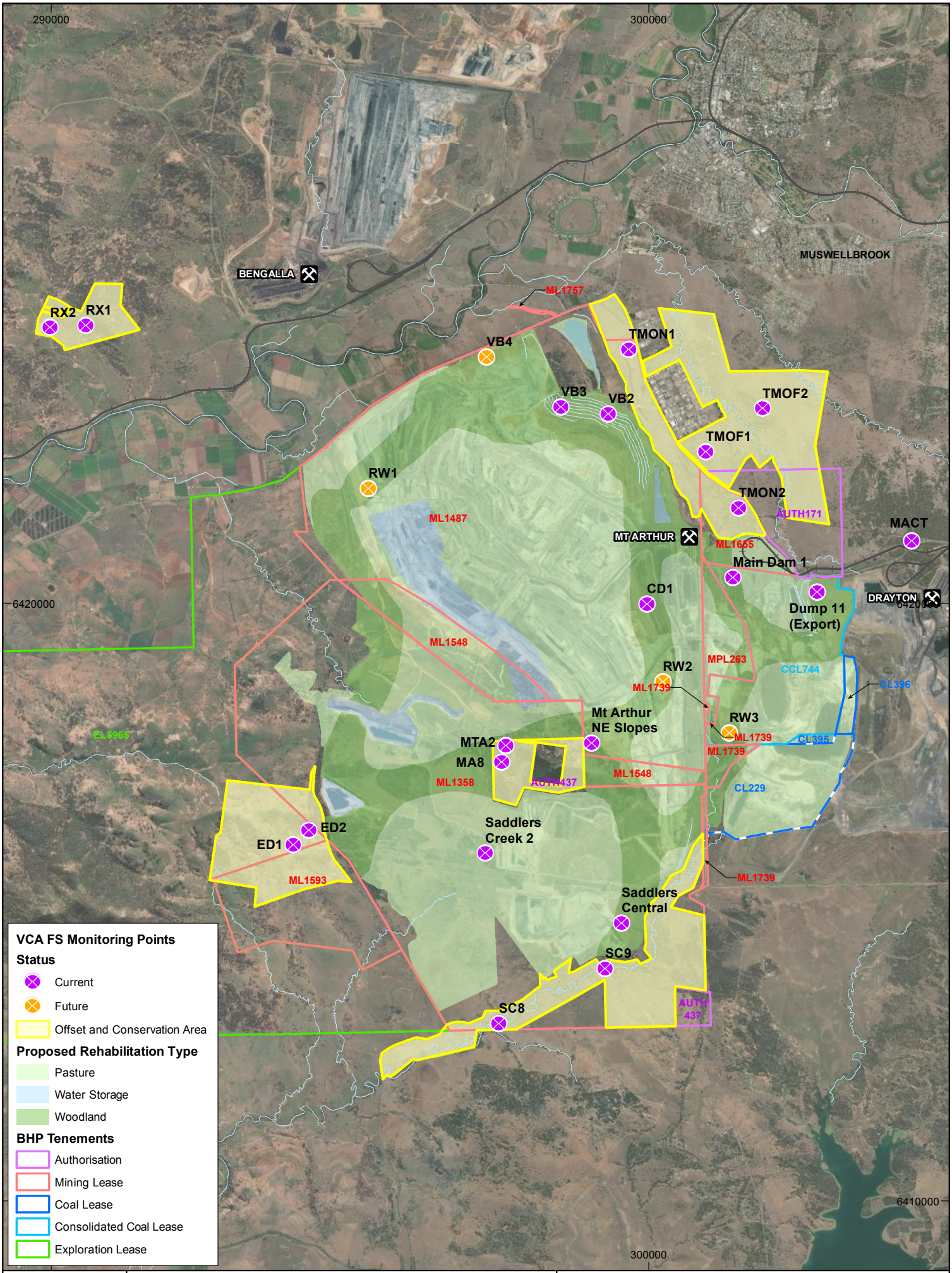
Drought affected areas have impacted progress for some woodland rehabilitation over the life of Mt Arthur Coal. Pasture has been planted on an interim basis to prevent wind and water erosion. Recently, in agreement with DPE, tube stock have been planted on the VD1 drought affected areas with little success. Irrigation is proposed in some areas to understand if it will improve success. This remedial process is captured by monitoring following the Rehabilitation and Ecological Monitoring Procedure requirements and implementation activities as per the TARP in Section 11.

Mt Arthur Coal have also recently completed two trial controlled burns, focussing on identification of risks and logistics. As part of a training exercise for the emergency response team, the controlled burns were conducted on the VD1 rehabilitation area. Further work will be conducted over the RMP period as part of revegetation trials on the VD1 rehabilitation area to transition this area to Box Gum Woodland.

10.3 Analogue Sites

Reference sites have been and will be established in the appropriate vegetation community for each community type being established, to provide an analogue site for comparison. Analogue (reference) along with other monitoring sites are listed in appendix 4 of the REMP and shown below in **Figure 7**. Analogue sites may be added from time to time, dependent on the mining and rehabilitation progression and access to relevant sites.

Pasture Assessment, using former Department of Primary Industry (DPI)-approved methodology and non-mined pasture reference sites for comparison. Pasture Assessment involves visually estimating the quantity and quality of available pasture by visually estimating the botanical composition and ground cover in the area.



BHP
Geospatial Team
Brisbane

0 2 4 km

Transverse Mercator Projection
GDA 1994 MGA Zone 56

MT. ARTHUR MINE
VCA AND FSA MONITORING LOCATIONS

Drawn: B. Lang	Date: 11/08/2020	Revision: 0
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11. Intervention and Adaptive Management

11.1 Threats to Rehabilitation

Section 7 discusses operational management of environmental risks specifically relating to rehabilitation. Building on the risks and issues discussed in **Section 6**, the major threats to the achievement of rehabilitation performance indicators and/or successful post-mining land use are summarised below. As discussed in **Section 9**, monitoring programs have been implemented to assess rehabilitation progress towards post-mining land use and identify potential threats that may impede that progress. The earlier these threats are identified, the greater the opportunity to introduce effective management actions to negate those threats. Such actions may include the implementation of remedial strategies to address realised impacts, or the modification of existing management processes to prevent impacts developing or worsening (i.e. adaptive management). A TARP has been developed to provide guidance on appropriate and timely response, if these threats should be identified or predicted.

11.1.1 Soils, Geology & Erosion

- Poor quality or insufficient topsoil due to natural deficiency or poor management, leading to inability to establish vegetation desired for ecological communities or grazing;
- Surface (wind or water) erosion leading to degradation of growth medium and rehabilitation quality;
- Major geotechnical failure of overburden emplacement, such as slumping or subsidence;
- Geotechnical failure of final void residual walls, leading to an unstable and potentially polluting landscape;
- Spontaneous combustion of near-surface waste material generating pollution, destabilising land surface and impeding vegetation establishment;
- Sodicity and/or salinity of spoils/soils leading to accelerated erosion and preventing successful vegetation establishment;
- Failure of water management structures (or natural drainage lines), leading to erosion, unstable landform and potential pollution; and
- Targeted land capability class not met by rehabilitated landform and soils.

11.1.2 Biological factors

- Insufficient, poor quality or incorrect species seed/seedlings leading to poor vegetation establishment;
- Inadequate weed control, leading to extreme weed competition preventing establishment of desired species;
- Continued dominance of exotic tropical grass species, preventing successful establishment of native grass groundcover;
- Inadequate vertebrate pest animal control leading to predation of juvenile vegetation and poor biodiversity (habitat) outcomes;
- Ecosystem processes (i.e. reproduction, nitrogen fixing and nutrient recycling) not re-established, leading to sterile unsustainable ecosystem;
- Insect attack, disease infestation causing premature vegetation die-back; and
- Poor vegetation development leading to simplified, non-stratified community structure of poor habitat value.

11.1.3 Environmental Factors

- Severe and/or prolonged drought leading to widespread failure of revegetation;
- Uncontrolled bush fire events leading to widespread failure of revegetation areas;
- Major Storm event resulting in flooding, geotechnical instability, major erosion and/or widespread damage to rehabilitation areas; and

- Unintended seasonal landform inundation or waterlogging preventing vegetation establishment or causing die-back of established vegetation.

11.1.4 Pollution Issues

- Soil/ overburden geochemistry leading to continuous offsite release of contaminants from mined materials/ waste material requiring long-term management or treatment;
- Unsatisfactory water quality of final void waters leading to environmental impacts, and failed post-mining void use; and
- Unexpected contaminated land (i.e. undisclosed asbestos or hazardous waste disposal areas), leading to costly treatment and disposal, and delayed relinquishment.

11.1.5 Management/ Organisational

- Poor systems implementation, leading to inadequate rehabilitation monitoring and maintenance;
- Inadequate resources lodged/ provisioned to successfully rehabilitate mine areas at closure;
- Evolving regulatory requirements, conflicting community expectations and district land uses leading to difficulties negotiating or attaining relinquishment criteria for older rehabilitation; and
- Pasture areas subjected to prolonged/ uncontrolled overgrazing by livestock, leading to loss of vegetative cover, erosion and land degradation.

11.2 Trigger Action Response Plan

A TARP (**Table 15**) has been developed that identifies potential post-rehabilitation trigger events or indicators, and the appropriate response strategies to be implemented should those triggers be realised. Accurate identification of trigger events provides for early responses to emerging rehabilitation risks. As well as identifying the initial trigger for response, Mt Arthur Coal's rehabilitation and ecological monitoring program shall be the primary means to monitor the effectiveness of the response actions.

As conditions on a mine change, new major hazards may be identified and added to the TARP. Mt Arthur Coal will regularly review its risks and update the TARP as required in line with any updates to the rehabilitation objectives, performance indicators and completion criteria in Table 5 and Table 6.

Table 15 Trigger Action Response Plan for Rehabilitation

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
Soils, Geology & Erosion					
1	Poor quality/ insufficient topsoil impeding vegetation establishment for ecological communities or grazing.	Monitoring programs: Landform Stability; Grazing Potential, Topsoil Monitoring.	Trigger: Progress indicators: Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Utilisation of subsoils/ spoil materials, with appropriate soil supplements and ameliorants, as alternates to topsoil. Appropriate delineation and recovery of all suitable topsoil resources and topsoil management in accordance with Land Management Procedure to ensure maximum available resource. Review post-mining land use selection to reduce topsoil intensive uses.	Superintendent Environment Superintendent Mid Term Planning
2	Surface (wind or water) erosion leading to degradation of growth medium and rehabilitation/offset quality.	Monitoring programs: Landform Stability; Post-mining landform digital terrain model.	Trigger: Progress indicators: Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability. Ground cover less than 50%	Ensure up-catchment reshaping minimises slopes >10° or incorporates appropriate drainage management. Review rehabilitation methods and monitoring/maintenance regime to identify root cause of erosion. Remediation of concentrated erosion impacts (if possible). Rapidly stabilise up-catchment substrate and increase organic matter using sterile cover crops and sow with appropriate ground cover species.	Superintendent Environment Superintendent Short Term Planning
3	Major geotechnical failure of overburden emplacement, such as slumping or subsidence.	Monitoring programs: Landform Stability Post-mining landform digital terrain model.	Trigger: Progress indicators: Landform Establishment. Geotechnical factor of safety less than 1.2.	Ensure emplacement reshaping minimises slopes >10° or incorporates appropriate drainage management. Review emplacement design, dumping methods and monitoring/maintenance regime to identify root cause of failure. Review impacts on proposed post-mine land use in affected area.	Manager Production Superintendent Environment Superintendent Short Term Planning

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
				Remedial earthworks and/or rehabilitation, as required.	Geotechnical Engineer
4	Targeted land capability class not met by rehabilitated landform and soils.	Monitoring programs: Landform Stability; Grazing Potential. Remote sensing	Trigger: Progress indicators: Landform Establishment; Growth Medium Development. Land and soil capability class lower than Class 2 in area identified in rehabilitation plan.	Review landform design, rehabilitation planning and reshaping operational controls to identify root cause of incorrect land capability class establishment.	Superintendent Environment Superintendent Short Term Planning
				Identify future rehabilitation for potential increase of land capability class area to compensate for current loss of area.	
				Investigate impact on proposed post-mining land use, to identify appropriate remedial strategies, or modification of post-mining land use options.	
5	Failure of water management structures (or natural drainage lines), leading to erosion, unstable landform and potential pollution.	Monitoring programs: Landform Stability; Post-mining digital terrain model; Remote sensing.	Trigger: Progress indicators: Landform Establishment; Growth Medium Development; Ecosystem/ land use Establishment. Geotechnical factor of safety less than 1.2. Groundcover less than 50% on stream banks	Review landform design and reshaping operational controls to identify root cause of poor drainage performance.	Superintendent Environment Superintendent Short Term Planning
				Develop remedial plan that repairs immediate failure and downstream impacts, improves up-catchment infiltration or drainage diversion.	
6	Sodicity and/or salinity of spoils/soils leading to accelerated erosion and preventing successful vegetation establishment.	Monitoring processes/ programs: Materials geochemical assessment during project planning. Landform Stability.	Trigger: Progress indicators: Landform Establishment; Growth Medium Development.	Conduct soil characterisation sampling and review current rehabilitation practices to identify root cause of erosion/dispersion.	Superintendent Environment
				Develop remedial plan that modifies existing process of soil characterisation and selection and rehabilitation to prevent recurrence, and treats and repairs immediate failure and downstream impacts (i.e. topdressing, gypsum application).	
				Revise proposed post-mining land use to ensure still appropriate for soil type, and identify long-term management requirements.	

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
7	Spontaneous combustion of near-surface waste material generating pollution, destabilising land surface and impeding vegetation establishment.	Monitoring processes/ programs: Materials geochemical assessment during project planning; Spontaneous combustion; Landform Stability.	Trigger: Significant or continued spontaneous combustion surface impacts.	Characterisation of spontaneous combustion risk and adoption of standard combustion prevention measures. Targeted monitoring program in vicinity of impacts. Remedial treatment (i.e. capping) as per Spontaneous Combustion Procedure. Remedial surface rehabilitation, if required.	Overburden Superintendent Mine Survey
8	Geotechnical failure of final void residual walls, leading to an unstable and potentially polluting landscape.	Monitoring processes/ programs: Geotechnical assessment of void walls during void treatment design; Landform Stability.	Trigger: Actual or predicted significant void wall failure. Geotechnical factor of safety less than 1.2.	Conduct geotechnical assessment of failed area, and review void treatment design to identify root cause of failure. Develop remedial plan that mitigates and makes safe the immediate failed area, addresses all associated impacts (i.e. reduced void storage capacity, water quality impacts). Review proposed post-mining void use to determine whether still achievable, and identify long-term management measures.	Geotechnical Engineer
Biological Factors					
9	Insufficient, poor quality or incorrect species seed/seedlings leading to poor vegetation establishment.	Monitoring programs: Ecological Development; Grazing Potential. Remote sensing	Trigger: Progress indicators: Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Review ecological monitoring results and, if required, seed viability testing to determine if seed/seedling quality is contributing to poor vegetation establishment. Identify required modifications to rehabilitation design or seed sourcing, and complete remedial planting works for areas of poor vegetation establishment. Establish a broad supply base of seed to mitigate supply limitations, and a broad species base to mitigate undersupply and climatic variation.	Superintendent Environment

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
10	Poor vegetation development leading to simplified, non-stratified community structure of poor habitat value.	Monitoring programs: Ecological Development. Remote sensing BAM calculator	Trigger: Progress indicators: Ecosystem/Land use Sustainability.	Review ecological monitoring results to determine likely causes of non-development of vegetation stratum (i.e. species selection, seed/seedling quality, vegetation establishment practices or site conditions) and identify remedial treatment options (i.e. remedial planting, modification of species selection and establishment method or additional ground treatment)	Superintendent Environment
				Conduct remedial treatment, as selected, and review rehabilitation practices to incorporate new measures.	
				Ensure species mix used in rehabilitation programs are aligned to the floristic structure of the targeted plant community/ reference sites.	
11	Inadequate weed control, leading to extreme weed competition preventing establishment of desired species.	Monitoring programs: Landform Stability; Ecological Development; Grazing Potential. Remote sensing	Trigger: Progress indicators: Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability. Weeds greater than analogue sites	Implement remedial treatment program to control weeds (i.e. chemical weed control, encourage rapid establishment of ground cover, scalping of surface layer, topdressing).	Superintendent Environment
				Weed control undertaken in accordance with the requirements of the Noxious Weeds Act 1993 by competent operators.	
				Weed species density and distribution monitored.	
				Topsoil supply treated for weeds prior to stripping, if required.	
12	Continued dominance of exotic tropical grass species, preventing successful establishment of native grass groundcover.	Monitoring programs: Ecological Development. Remote sensing	Trigger: Progress indicators: Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Review of ecological monitoring results to identify species of concern, and most appropriate treatment (including cost/benefit analysis on starting rehabilitation again).	Superintendent Environment
				Identify best treatment options, which may include chemical spraying, slashing, cultivating, burning or grazing existing groundcover, and vegetation establishment, which may include tubestock planting or direct drilling seed.	

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
				Ensure intensified monitoring during re-establishment of remedially treated rehabilitation, and review ongoing monitoring/ maintenance regime to ensure adequate.	
13	Inadequate vertebrate pest animal control leading to predation of juvenile vegetation and poor biodiversity (habitat) outcomes.	Monitoring programs: Ecological development; feral animal register; community consultation.	Trigger: Progress indicators: Ecosystem/Land use Sustainability.	Review of ecological monitoring results and feral animal register to identify species of concern (rabbit, deer, wild dog fox, pig, goat, etc), damage from pest animal species, and most appropriate treatment regime. Implement control program and intensified monitoring program to determine program success. Pest animal control undertaken by competent/ licenced operators.	Superintendent Environment
			Increasing presence of feral animals.	Consult with neighbouring/ district landowners to coordinate control programs.	
14	Ecosystem processes (i.e. reproduction, nitrogen fixing and nutrient recycling) not re-established, leading to sterile unsustainable ecosystem.	Monitoring programs: Landform Stability; Ecological Development; Grazing Potential. Remote sensing BAM calculator	Trigger: Progress indicators: Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Review ecological monitoring results and, if required, conduct targeted sampling to determine likely causes of non-development of processes (i.e. oversupply or undersupply of nutrients, species selection, soil properties or climatic contributors) and identify remedial treatment options (i.e. mulches, composts, biosolids, inoculants, remedial planting, species selection, etc).	Superintendent Environment
				Conduct remedial treatment and/or review rehabilitation planning and practice to incorporate new treatment measures.	
				Review monitoring program to more accurately detect the presence/ absence of process indicators.	
15	Insect attack, disease infestation causing premature vegetation die-back.	Monitoring programs: Ecological Development.	Trigger: Progress indicators: Ecosystem/Land use Establishment;	Review ecological monitoring results and, if required, conduct targeted sampling to determine likely causes of infection/ infestation) and identify remedial treatment options.	Superintendent Environment

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
			Ecosystem/Land use Sustainability.	Conduct remedial treatment, if required, and review rehabilitation maintenance practices to incorporate new treatment measures. Review monitoring program to more accurately detect the presence/ absence of disease indicators. Aim to encourage diversity within the vegetation (i.e. colonisation by spiders, insects, frogs, lizards and insectivorous birds) by providing suitable habitat features and vegetation complexity.	
Environmental Factors					
16	Unintended seasonal landform inundation or waterlogging preventing vegetation establishment or causing die-back.	Monitoring programs: Landform Stability; Ecological Development; Grazing Potential.	Trigger: Progress indicators: Landform Establishment; Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Conduct geotechnical/ hydrological assessment of impacted area, to identify root cause of seasonal inundation (i.e. landform settlement, poor drainage design/ construction) and develop remedial plan that may involve remedial drainage works, remedial planting, or modification of species selection. Review proposed post-mining land use for the area to determine whether still achievable, or whether area might be best suited to new purpose (i.e. seasonal wetland/ habitat) and identify long-term management/ mitigation measures.	Superintendent Environment
17	Major storm event resulting in flooding, geotechnical instability,	Monitoring programs: Landform Stability; Ecological Development.	Trigger: Progress indicators: Growth Medium Development,	Review landform planning and design, and rehabilitation practices, to identify root cause of poor drainage/ rehabilitation performance.	Superintendent Environment

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
	major erosion and/or widespread damage to rehabilitation areas.		Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Implement remedial plan that repairs or reinstates the immediate area of rehabilitation and water management structure failure, and all associated downstream impacts, improves catchment infiltration, and drainage design (i.e. improves vegetative cover). All final landforms should be designed in accordance with Blue Book Volume 2E, to cope with major storm events (1 in 20 year ARI). Adopting more stringent design criteria may be warranted, if failure is common or widespread, or storms are frequent.	Superintendent Short Term Planning
18	Severe and/or prolonged drought leading to widespread failure of revegetation.	Monitoring programs: Landform Stability; Ecological Development; Grazing Potential.	Trigger: Progress indicators: Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Review rehabilitation practices, to identify any opportunities for drought-proofing rehabilitated areas (i.e. provide internally draining areas, temporary survival irrigation until establishment, or appropriate species selection). Ensure intensified monitoring is undertaken during and after drought to observe rehabilitation performance and resilience. All assessment should be relative to monitored performance of reference sites, to determine whether impacts are rehabilitation specific. Plans should be prepared for post-drought remedial revegetation, if required. Include updates to government during annual reporting on remedial measures. Remedial tree planting and	Superintendent Environment
19	Uncontrolled bush fire events leading to widespread failure of revegetation areas.	Monitoring programs: Landform Stability; Ecological Development; Grazing Potential.	Trigger: Progress indicators: Ecosystem/Land use Establishment;	Attempts should be made, within the capabilities of site resources and the RFS, to prevent uncontrolled fires reaching newly rehabilitated areas.	Superintendent Environment

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
			Ecosystem/Land use Sustainability.	Review fire control and incident response practices, including consultation with local RFS, to identify the root cause for fire initiation and spread into rehabilitated areas, and modify site procedures to reduce the potential for recurrence.	
				Ensure intensified monitoring is undertaken after fire to record fire impact, and observe rehabilitation resilience during recovery.	
				Plans should be prepared for post-fire remedial revegetation, if required.	
Pollution Issues					
20	Release of leachate/ contaminants from mined materials/ waste material requiring long-term management or treatment.	Monitoring programs: Landform Stability	Trigger: Progress indicators: Decommissioning; Landform Establishment.	Response will be in accordance with the Groundwater and Surface Water Response Plan, and will involve the confirmation of laboratory results, investigation of cause, proposal of remedial options, then implementation of remedial strategy.	Superintendent Environment
		Monitoring programs: Water monitoring/ modelling.	Trigger: discharge/ seepage from emplacements exceeds EPL/ Water Management Plan water quality criteria.	Water monitoring will be ongoing to determine impact of remedial strategy. Overall monitoring program should be reviewed to ensure continued suitability, in light of investigation findings.	
21	Unsatisfactory water quality of final void waters leading to environmental impacts, and failed post-mining void use.	Monitoring programs: Landform Stability	Trigger: Progress indicators: Decommissioning; Landform Establishment; Growth Medium Development.	Response will be in accordance with the Groundwater and Surface Water Response Plan, and will involve the clarification of monitoring data, investigation of cause, proposal of remedial options, then implementation of remedial strategy.	Superintendent Environment

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
		Monitoring programs: Water monitoring/ modelling.	Trigger: void water quality exceeds EPL/ Water Management Plan water quality criteria.	Water monitoring will be ongoing to determine impact of remedial strategy. Overall monitoring program should be reviewed to ensure continued suitability, in light of investigation findings. If required, the decommissioning, rehabilitation and final-use strategies for final voids should also be reviewed to determine ongoing suitability.	
22	Unexpected contaminated land, leading to costly treatment and disposal, and delayed relinquishment.	Monitoring programs: Waste disposal management contract. Asbestos register. Contaminated Site Register.	Trigger: Progress indicators: Decommissioning; Landform Establishment.	Works to be halted or relocated, and site appropriately isolated until declared safe for human access.	Superintendent Environment
			Trigger: project specific contamination investigation criteria exceeded, or asbestos in path of proposed disturbance.	Site contamination assessment, remediation and clean-up by qualified consultant, as required.	
				Appropriate notifications made to EPA and other regulators.	
				Maintain the asbestos and contaminated land registers via regular reviews.	
Management and Organisational Factors					
23	Inadequate resources lodged/ provisioned to successfully rehabilitate mine areas a closure.	Monitoring processes:	Trigger: Internal rehabilitation provisioning does not cover liability at start of final AFP period.	Use qualified personnel to review rehabilitation liability calculations and address any shortfalls identified.	Superintendent Environment Manager Technical Services
		RCE calculations and progress indicators		Investigate opportunities for accelerated decommissioning and rehabilitation while mine still operating.	
		Rehabilitation provisioning		Review Mine Closure Plan to identify opportunities for streamlining the closure process, while still meeting Relinquishment criteria	

#	Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
24	Poor systems implementation, leading to inadequate rehabilitation monitoring and maintenance.	Monitoring; completion of all Ecological and Rehabilitation monitoring programs.	Trigger; non-achievement of actions and measures committed to in RMP and OMPs	Appropriate resourcing to ensure all monitoring and management actions are completed as required in RMP or OMPs.	Superintendent Environment
25	Evolving regulatory requirements, community expectations and district landuses leading to difficulties attaining rehabilitation completion	Monitoring Process: Project Approvals and stakeholder consultation processes.	Trigger: DA lodgement for non-mining/ non-rural landuses adjacent to mine/ mine rehab.	Monitor trends and developments in legislation and changes to community expectations.	Superintendent Environment
				Make submissions to incompatible development applications in proximity of site rehabilitated areas.	
				Continue to regularly consult with stakeholders to gain acceptance of completion criteria.	
26	Pasture areas subjected to prolonged/ uncontrolled overgrazing by livestock, leading to loss of vegetative cover, erosion and land degradation.	Monitoring Program: Grazing Potential	Trigger; Progress Indicators for Growth Medium Development; Landuse Establishment;	Destock degraded paddocks until adequately recovered.	Superintendent Environment
			Landuse Sustainability	Increase frequency of Ground and Pasture Assessments, and closely monitor recovery trends.	
				Review contractual arrangements with grazier to include mechanism for preventing de-stocking, and review monitoring frequency.	

12. Review and Implementation of the RMP

12.1 Review of the RMP

The mining lease conditions require that a Rehabilitation Management Plan must be prepared and submitted to the Department at the following times:

- Consultation Draft Code of Practice: Rehabilitation Management Plan for Large Mines;
- before commencing surface disturbance;
- every 5 years from the date of approval of the lease holder's first Rehabilitation Management Plan;
- at least 3 months before the final cessation of the extraction;
- concurrently with the submission of an extraction management plan (if required by the Development Consent in relation to some underground mines);
- within 30 days of suspending operations (i.e. going into care and maintenance following written consent from the Minister under clause 7A of Schedule 1B of the Mining Act); and
- as otherwise directed by the Minister.

The Rehabilitation Management Plan covers the Schedule 3 Condition 44 Project Approval requirement which requires this plan to be prepared to the satisfaction of the Resources Regulator. Schedule 5 Condition 4 of the Project approval includes the requirement to revise strategies, plans and programs within three months of:

a) the submission of an annual review;

b) the submission of an incident report;

c) the submission of an audit; or

d) any modification to the conditions of approval.

Where this review leads to revisions in any such document, then within four weeks of the review the revised document must be submitted to the Secretary for approval.

Note: This is to ensure the strategies, plans and programs are updated on a regular basis.

12.2 Implementation

Title	Responsibility
General Mine Manager	Provide resources required to undertake mine and rehabilitation planning, and implement RMP commitments. Internally approve RMP
Manager Technical Services	Assist, where relevant, to implement the strategies and commitments presented in this RMP. Oversee and facilitate the mine planning required for the RMP. Provide mine planning, mining progression and disturbance information for reporting in the Annual Review.

Title	Responsibility
Manager HSE	Provide support for the implementation of Health Safety and .Environment responsibilities. Consult with regulatory authorities as required. Provide for the engagement of external assistance as required.
Superintendent Environment	Provide support for the implementation of Environment responsibilities. Supervise the preparation and implementation of the RMP. Consult with regulatory authorities as required. Supervise the preparation of the Annual Review.
Specialist Rehabilitation and Closure	Provide for the engagement of external assistance as required. Implement, monitor and review the programs and commitments contained in this RMP and supporting procedures Report the progress of mine disturbance, rehabilitation and monitoring in the Annual Review.
Mine Surveyor	Assist with preparation of RMP Plans. Verification of RMP Plans for submission to Resource Regulator and DPE.
Principal Corporate Affairs	Ensure RMP is communicated to community via CCC.

Appendix 1 Document Authorisation

Business Process Owner Endorser Authorisation			
Position	**Name**	**Date**	**Signature**
Manager HSE	Hannah Farr		

Approver Authorisation			
Position	**Name**	**Date**	**Signature**
General Manager	Adam Lancey		

Amendment History			
Date	**Version**	**Page**	**Details**
June 2019	Version 1.0	All	New RMP format and separated from the Mine Operations Plan as per the new Resource Regulator Guidelines.
April 2020	Version 2.0	All	Update RMP for submission with Annual Forward Plan, to align with Resource Regulator guidelines
June 2021	Version 3.0	All	Update RMP following rehabilitation risk assessment

Appendix 2 References

Site Reference	Title	Rehabilitation Objectives Reference
	Project Approval 09_0062 MOD 1. Mt Arthur Coal Mine – Open Cut Modification Project, NSW Department of Planning and Environment, September 2014.	PA 09_0062 MOD 1
	Environmental Protection and Biodiversity Conservation Act Approval 2011/5866. Department of Sustainability, Environment, Water, Population and Communities, April 2012.	EPBC Approval
	Environment Protection Licence No. 11457	EPL
	Our Requirements for Environment and Climate Change	
	Our Requirements for Closure	
MAC-CPP-PRO-016	Management of CHPP Product Coal Stockpiles	
MAC-ENC-MTP-034	Site Water Management Plan	SWMP
MAC-ENC-MTP-040	Air Quality Management Plan	
MAC-ENC-MTP-042	Aboriginal Heritage Management Plan	
MAC-ENC-MTP-047	Rehabilitation Strategy	Rehabilitation Strategy
MAC-ENC-MTP-050	Biodiversity Management Plan	BIOMP
MAC-ENC-MTP-052	Mt Arthur Coal Mining Operations Plan (now Annual Forward Program)	
MAC-ENC-PRG-002	Spontaneous Combustion Control Program	
MAC-ENC-PRO-012	Land Management	
MAC-ENC-PRO-029	Spill Response Procedure	
MAC-ENC-PRO-033	Waste Handling and Disposal	
MAC-ENC-PRO-059	Site Water Balance	
MAC-ENC-PRO-060	Erosion and Sediment Control Plan	
MAC-ENC-PRO-061	Surface Water Monitoring Program	
MAC-ENC-PRO-062	Groundwater Monitoring Program	
MAC-ENC-PRO-063	Surface and Ground Water Response Plan	
MAC-ENC-PRO-073	Hunter River Water Discharge Procedure	
MAC-ENC-PRO-074	Contaminated Land Management	
MAC-ENC-PRO-076	Bushfire Prevention Procedure	Bushfire Prevention Procedure
MAC-ENC-PRO-080	Rehabilitation and Ecological Monitoring	

Site Reference	Title	Rehabilitation Objectives Reference
MAC-HSE-PRO-002	Pest Animal Management Procedure	
MAC-PRD-PRO-149	ROM Coal Stockpile Procedure	
MAC-PRD-STD-003	Design Construction and Maintenance of Dump Areas	Dump Standard
MAC-STE-PRO-010	Emergency Procedure - Bushfires	
MAC-STE-PRO-013	Hazardous Materials Management Procedure	
NEC-HSE-PRO-001	Permit to Disturb Procedure	
NEC-STE-MTP-009	Pollution Incident Management Response Plan	
TBD	Rehabilitation Management Plan	RMP
BHP 2017	BHP Coal Landform Design Guidelines	BHP 2017
BHP MAN	BHP Coal Rehabilitation Manual	BHP MAN
096370	BHP Acid and Metalliferous Drainage Management Standard	BHP AMD Standard
MAC GPA	Mt Arthur Coal Ground and Pasture Assessment (Emergent Ecology, 2016)	MAC GPA
	Rawlings, K.; Freudenberger, D.; and Carr, D.; A Guide to Managing Box Gum Grassy Woodlands. Department of the Environment, Water, Heritage and the Arts, 2010.	Rawlings et al
	NSW Dam Safety Committee approval conditions	DSC
	Hansen Bailey (2009) Mt Arthur Coal Consolidation Project Environmental Assessment	2009 EA
	Resource Strategies (2013) Mt Arthur Coal Open Cut Modification Environmental Assessment	2013 EA
N/A	Managing Urban Stormwater Guidelines: Volume 2E Mines and Quarries. NSW EPA, 2008.	Blue Book Vol 2E
	Grigg, A., Emmerton, B.R. and McCallum, N.J. ACARP Project C8038: Completion Criteria for Pasture Based Rehabilitation in the Bowen Basin. CMLR, University of Queensland. August 2001.	Grigg et al
	Andrews, N, (1999) Synoptic Plan – Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales, Prepared for the NSW Department of Mineral Resources.	Resources Regulator Synoptic Plan
	Elliot, G.L. and Veness, R.A. Selection of Topdressing Material for Rehabilitation of Disturbed Areas in the Hunter Valley. J.Soil Cons, NSW 37 37-40, 1981.	Elliot & Veness
	Hazelton, P.A. & Murphy, B.W. Interpreting Soil Test Results: What do all the numbers mean? (2nd ed.). CSIRO, 2007.	Hazelton & Murphy
	Short T (2020) Rehabilitation completion criteria and performance standards for Mt Arthur coal mine. A report prepared for Hunter Valley Energy Coal by Highlands Environmental, Emerald.	Short T (2020)

Appendix 3 Consultation

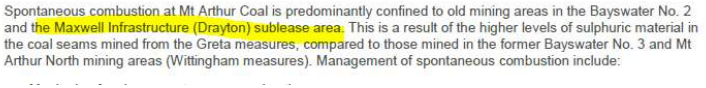
Stakeholder Comments		MAC Responses
BCD Comments		
1	BCD recommends that Kikuyu is not included in the pasture mix Table 11 'Mt Arthur Coal Pasture seed mix' includes Kikuyu (*Cenchrus clandestinus*). This exotic grass is an aggressive and persistent species that will hinder woodland rehabilitation if it gets in there, which can readily occur from adjacent pasture rehabilitation areas. BCD therefore recommends that Kikuyu is not included in the pasture seed mix. Recommendation 1 BCD recommends that Kikuyu (*Cenchrus clandestinus*) is not included in the pasture seed mix for the mine site.	MAC notes that the pasture seed mix includes multiple exotic perennial grasses with the objective of establishing capable pasture. As such kikuyu is assisting achieving that goal. The species listed for pasture areas is subject to change as monitoring data is collected and analysed for improvements. MAC will continue to improve species lists to achieve sustainable mine rehabilitation
2	Vegetation communities to be created by rehabilitation must be recognisable, self-sustaining versions of those targeted communities Table 2 'Regulatory Requirements Related to Rehabilitation' refers to the eight vegetation communities targeted to be recreated by post-mine rehabilitation: Box-Gum woodland Upper Hunter White Box – Ironbark Grassy Woodland Central Hunter Box – Ironbark Woodland Central Hunter Ironbark – Spotted Gum – Grey Box Forest Narrabeen Footslopes Slaty Box Woodland Hunter Floodplain Red Gum Woodland Complex White Box – Yellow Box – Blakely's Red Gum Woodland, and Hunter Lowlands Red Gum Forest The 'summary of status' states that 'species composition and structure reflects the communities mentioned in conditions 36 and 38(a) of PA 09_0062 MOD 1. BCD recommends that the criteria for determining that these communities have been established is for them to be recognisable, self-sustaining versions of those	There is no requirement to recreate a specific "Plant Community Type" (PCT) within mine site rehabilitation areas. Condition 38 refers to the offset strategy and/or rehabilitation strategy to meet these requirements. For example, the Hunter Lowlands Red Gum Forest would be difficult to establish on rehabilitated overburden dumps and therefore is found in the offsets. The requirement needs to be considered in terms of the offset strategy and rehabilitation commitments in the Environmental Assessment. Figure 5 of the RMP is a recreation of Figure 19 of Appendix D Figure Environmental Assessment (EA) for the approved modification to the Mt Arthur Coal Mine Open Cut Consolidation Project Approval 09 shows the woodland corridor. The only requirements for the woodland corridor are for: Re-establishment of 500 ha Box Gum Woodland. Establishment of native woody vegetation that maximises diversity and provide additional habitat for native flora.

Stakeholder Comments		MAC Responses
	vegetation communities or else there is a risk that revegetation will create novel ecosystems. BCD also recommends that the word 'recognisable' is added to the rehabilitation objective in Table 5 'Domain Species Rehabilitation Objectives' for the 'Native ecosystem – native woodland' domain, at the 'Area of native woodland' indicator (page 48). Recommendation 2 BCD recommends that post-mine rehabilitation targeting specific plant communities results in recognisable, self-sustaining versions of those vegetation communities.	Woodland areas outside of the Box Gum Woodland Establishment Area are approved to be a novel ecosystem with the intent of establishing native vegetation and providing habitat. Previous approval (Mt Arthur Consolidation Project) "Replanting of mine rehabilitation will use local native species… This will Maintain or establish corridor connectivity as mining progresses; Improve the quality and diversity of native growth in rehabilitation areas; Maximise the establishment of a diversity of native species particularly the understorey species that maintain the ecological function of native vegetation communities; and Provide additional Habitat for native flora." Previous submissions of the RMP provided to OEH for comment have utilised this same approach. Compliance with Schedule 3 Condition 39 is achieved by the combination of the Box Gum Woodland Establishment Area and the MAC Biodiversity Offset areas which account for the other communities listed in the condition. Domain Specific Completion Criteria are presented in Table 5 and Phase Specific Rehabilitation Objectives are presented in Table 6. The criteria and objectives are designed to be measurable and achievable with further improvements planned (refer to Section 7.3.7). This will include measurable metrics on sustainability as well as criteria on species composition of mine rehabilitation areas. No change has been made to the RMP.

Stakeholder Comments		MAC Responses
3	BCD recommends that topsoil used for rehabilitation areas does not contain perennial exotic grasses Section 7.3.1 Active Mining: Topsoil Retention' (on pages 93 and 94) summarises the process of assessing and recovering topsoil for use in mine rehabilitation areas. There is no mention of an assessment of exotic perennial grasses in the area where topsoil is proposed to be collected from. If not covered by other, related documents, such as the 'BHP Coal Rehabilitation Manual' or the 'Topsoil Management Plan', then BCD recommends that topsoil containing Kikuyu, Rhodes Grass (*Chloris gayana*), African Lovegrass (*Eragrostis curvula*), Coolatai Grass (*Hyparrhenia hirta*) or *H. rufa* is treated so that all seeds and plant fragments are killed so that those grasses are not brought into areas to be rehabilitated to native woodland communities. These grasses tend to be long-lived, including as seed, and their establishment in woodland rehabilitation areas will hinder the growth and establishment of native woodland species, and may prevent rehabilitation objectives from being achieved. Recommendation 3 BCD recommends that topsoil containing exotic perennial grasses is treated so that those grasses are not introduced into areas on which native woody vegetation communities are to be re-established.	MAC understands the BCD recommendation to treat topsoil however BCT hasn't provided any practical suggestion on how the soil should be treated. Topsoil recovered by MAC for use in rehabilitation is mostly from highly disturbed agricultural land or disturbed grazed native vegetation communities, hence has a high content of exotic perennial grasses. The Topsoil Management Plan details selective handling of topsoil. Weed assessment is part of the MAC Permit to Disturb process and focusses on Priority Weeds. The intent is that topsoil stripped from areas determined to contain large numbers of listed weeds are not stripped and areas with a high content of exotic perennial grasses are directed to pasture rehabilitation aras. No change has been made to the RMP.
4	BCD recommends that different seed mixes are used to recreate the different native woody vegetation communities Table 12 'Mt Arthur Coal native woodland species list' is a generic mix of species that is at odds with the species composition of the seven vegetation communities to be recreated in accordance with consent condition 38(a) of PA 09_0062 MOD 1. BCD recommends that specific seed mixes are prepared for each of those seven targeted native woody plant communities (as has been done for Box – Gum woodland – given in Table 13), so that	There is no requirement to recreate a specific "Plant Community Type" (PCT) with our mine site rehabilitation areas. Refer to response of Recommendation 2. The species listed for both Woodland areas and Box-Gum areas is subject to change as monitoring data is collected and analysed for improvements. MAC will continue to improve species lists to achieve sustainable mine rehabilitation, this will not include the establishment of specific PCTs.

Stakeholder Comments		MAC Responses
	recognisable plant communities are produced to meet consent requirements; rather than novel ecosystems. Recommendation 4 BCD recommends different seed mixes are made and used to generate recognisable versions of all of the targeted woody vegetation communities required by consent conditions.	Woodland areas outside of the Box Gum Woodland Establishment Area are approved to be a novel ecosystem with the intent of establishing native vegetation and providing habitat. No change has been made to the RMP.
5	BCD recommends that Ecological Development Monitoring checks for key species in revegetation mix that will guide vegetation structure and composition Section 9.1.4 'Ecological Development Monitoring' describes the process of annual assessments of revegetation areas for the trend in the vegetation composition and structure, and fauna habitat resources. A general assessment may miss the presence of key species that will delay targeted vegetation communities or required fauna resources from being developed. BCD recommends that note is made of the presence, identify and abundance of: key canopy, shrub and groundcover species for each targeted vegetation community – these will determine recognisability of the created vegetation communities key species that will drive the structure of each targeted vegetation community plants of different life forms and life spans (particularly species of Acacia) – these will give a measure of resilience, and whether a mass die-off of short-lived species may be likely plants for specific fauna habitat resources, such as winter-flowering Eucalypts (such as Eucalyptus albens and E. tereticoirnis), or pinnate-leaved species of Acacia. Recommendation 5 BCD recommends that during annual monitoring that note is made of the presence, identity and abundance of key plant species that	In accordance with the Rehabilitation and Ecological Monitoring Program, the MAC includes Vegetation Community Assessment (VCA). VCA monitoring systematically observes and documents changes in vegetation condition, composition and development through time, make comparisons to appropriate Plant Community Type (PCT) benchmark data (NSW Government 2020) The VCA monitoring includes plot surveys where data is recorded utilising the Biodiversity Assessment Method (BAM), meandering transects, and photo monitoring. The BAM is the current floristic survey methodology developed and supported by the NSW Environment, Energy and Science Group of the Department of Planning, Industry and Environment (formerly the NSW Office of Environment and Heritage) and prescribed by the NSW *Biodiversity Conservation Act 2016* and accompanying regulations. No change has been made to the RMP.

Stakeholder Comments		MAC Responses
	will affect the recognisability, resilience, structure and fauna resources from the post-mine rehabilitation.	
	BCD recommends that analogue site selection is done carefully to provide an appropriate comparison for targeted vegetation communities Section 10.2 'Analogue Sites' describes the process to identify and use references sites against which the compare revegetation to targeted vegetation communities. BCD recommends that this process is done with consideration of: the quality of the vegetation at the reference site (is it in good condition?) its history (is it likely to be missing key species, say the more palatable species, due to a long history of grazing? Do additional species need to be added to the rehabilitation?) its substrate (is it a good match to that on the post-mined landscape, such as vegetation communities from high nutrient, basalt-derived soils?), and its landscape position (does it have comparable hydrology?). Recommendation 6 BCD recommends that the selection of reference sites of remnant native vegetation is justified on how they are a meaningful target, for factors including vegetation quality, previous site disturbance and similarity in environmental factors such as slope, hydrology and soils. BCD recommends that any deficiencies in analogue sites are identified and addressed by management actions to the post-mine rehabilitation.	Monitoring sites have been chosen to align with the Conservation Agreement monitoring locations. As noted in Section 10.3 Analogue sites may be added from time to time, dependent on the mining and rehabilitation progression and access to relevant sites. No change has been made to the RMP.
Maxwell Infrastructure Comments		

Stakeholder Comments		MAC Responses
1	References to the sublease are the “Maxwell Infrastructure (Drayton) Sublease area”. Suggest the sublease be defined as “the Sublease” and then use that term throughout the document. For the record we own the lease, but MAC has full control of the area and responsibility for the area. Example below:  Spontaneous combustion at Mt Arthur Coal is predominantly confined to old mining areas in the Bayswater No. 2 and the Maxwell Infrastructure (Drayton) sublease area. This is a result of the higher levels of sulphuric material in the coal seams mined from the Greta measures, compared to those mined in the former Bayswater No. 3 and Mt Arthur North mining areas (Wittingham measures). Management of spontaneous combustion include:	MAC taken as a comment. No change has been made to the AFP.

Stakeholder Comments		MAC Responses
2	The conveyor corridor is NOT between Mt Arthur and Maxwell. It is internal to Mt Arthur's operations. See below **2.2 Current Consents, Leases and Licences** ~~Extract from the code.~~ Under the mining lease conditions, the lease holder must have the following components of the Rehabilitation Management Plan approved by the Minister: the Rehabilitation Objectives and Completion Criteria (Part 5); and, the Final Landform and Rehabilitation Plan (Part 6). The remaining components of the Rehabilitation Management Plan do not require approval but must still be provided as they comprise essential context for assessing the Rehabilitation Objectives and Completion Criteria, and the Final Landform and Rehabilitation Plan. The remaining components must be prepared to the satisfaction of the Minister. Details on Mt Arthur Coal's existing statutory approvals as at ~~March 2020~~May 2021 are provided in **Table 1**. The Modification Project includes the following key components: • a four year continuation of the open cut mine life from 2022 to 2026 at the currently approved maximum rate of 32 Mtpa; • an increase in open cut disturbance areas; • use of the existing conveyor corridor between Mt Arthur Coal and Maxwell Infrastructure for overburden emplacement; • duplication of the existing rail loop; • an increase in the maximum number of train movements per day from 24 to 30; • the relocation of the load point for the overland conveyor which delivers coal to Macquarie Generation's Bayswater Power Station; • the relocation and upgrade of the explosives storage, magazine and associated facilities; and • the construction of additional offices, a control room and a small extension to the ROM coal stockpile footprint.	The Mining lease (ML1793) that contains a section of the referenced shares borders with both MAC operations and Maxwell Infrastructure operations. No change has been made to the RMP.

Stakeholder Comments		MAC Responses
3	Figure 1 excludes the boundary of sublease of CL229 and should be included. The reason is not that the Project Approval boundary overlays the sublease, as the boundaries are not entirely coincident.	Figure 1 of the RMP has been updated
Muswellbrook Shire Council		
Annual Forward Program		
1	**1.2.2 Construction** The construction of a deployment facility to the western side of the main pit which including carparks, change rooms, crib huts, ablutions and office buildings. Is it intended that these facilities be accessed from Thomas Mitchell Drive, Denman Road or Edderton Road? Current approvals may limit access to Thomas Mitchell Drive, this should be checked.	The major access for employees and services remains to be Thomas Mitchell Drive. The 2014 Modification allowed for limited deployment from Thomas Mitchell Drive and the western side of the mine i.e. Edderton Road. Any activities will be in accordance with the MAC Project Approval and Environmental Assessment MAC acknowledges that the wording may result in confusion and have removed the section from the AFP.
2	**1.2.4 Overburden Emplacement** With the exception of the tailings emplacement expansion walls, these emplacement areas are designed by mine planning	The condition and commitments referenced do not apply to the walls of the extension of the tailings facility as the surfaces will not

<table>
<tr><th colspan="2">Stakeholder Comments</th><th>MAC Responses</th></tr>
<tr><td></td><td>engineers. The extended tailings emplacement walls were designed by an external consultant.

It would be preferable that this section be reworded slightly to relate back to the conditions of consent and Rehabilitation Management Plan:

With the exception of the tailings emplacement expansion walls, these emplacement areas will be designed by mine planning engineers and the extended tailings emplacement walls will be designed by an external consultant to ensure they will achieve the objectives in Table 14. Schedule 3, Condition 41A and in section 4 of the approved RMP.</td><td>be at final landform. The tailings storage facility is planned for overburden emplacement as part of the closure process.

No change has been made to the AFP.</td></tr>
<tr><td>3</td><td>4.1 Three Yearly Forecast Cumulative Disturbance and Rehabilitation Progression
Table 2: Predicted cumulative disturbance and rehabilitation progression during the next 3-year term

<table>
<tr><td>Year</td><td>Total Disturbance Footprint - Surface Disturbance (ha)</td><td>Underground mining area (ha)</td><td>Total Active Disturbance (ha)</td></tr>
<tr><td>End FY22 (30 Jun 2022)</td><td>5589</td><td>0</td><td>4506</td></tr>
<tr><td>End FY23 (30 Jun 2023)</td><td>5702</td><td>0</td><td>4643</td></tr>
</table></td><td>Disturbance figures quoted are in accordance with the MAC project approval and represents a reduction on disturbance predicted previous MOP/AFP submissions.

However, the increase in actual disturbance since the FY20 submission do require a recalculation of the RCE.</td></tr>
</table>

Stakeholder Comments		MAC Responses
	End AFP 6060 0 4960 (30 Jun 2024) Council Officers note that the trend to an increase in the total area of active disturbance over the next 3 years. This is a concern give the current approval for coal extraction expires in 2026, the result being that most rehabilitation will only commence once extraction ceases, which present a number of potential risks. Council Officers support a review of the calculation of the rehabilitation cost estimate following approval of the AFP to ensure the bond held by DPIE is sufficient to complete rehab works in a timely manner if necessary.	96 96
Rehabilitation Management Plan		
4	It is noted that MAC are only committing to natural landforms for landforms created after 26 September 2014. Council maintains ongoing concern with the visual impact of earlier landforms that are highly visible from the Muswellbrook Township and public roads/places.	MAC notes and values Councils' feedback on visual amenity. MAC considers that the visual impact from these landforms will soften as rehabilitation matures. No change has been made to the RMP.
5	It is noted that the proposed indicator for successful management of erosion of the final voids landforms (and the other landforms as well) is the establishment of not less than 50 % groundcover. MAC has previously said it is difficult to find a metric to use for measuring erosion management success other than % groundcover. However MAC staff inspect rehab areas following significant rainfall and schedule repairs when erosion rills form in the various landforms. Likewise Resources Regulator staff would be asking for action to repair obvious erosion after they complete site audits/inspections. This indicates that there must be a quantifiable metric in use to trigger action. Council's suggested metrics are:	References that MAC have previously made regarding erosion indicators has been regarding Completion Criteria rather than ongoing management. MAC agrees that the development of SMART metrics is required for ongoing management of rehabilitated areas and is progressing through this project. MAC is currently completing updates to the Rehabilitation Objectives (Table 5 of the RMP) for the Landform Establishment Phase and have engaged Godlers to complete this work. The report is currently in draft form and has not been finalised in time for this submission. MAC has also committed to a

Stakeholder Comments		MAC Responses
	Establishment of not less than 50 % groundcover and no erosion rills exceeding a depth or width of 100 mm.	project for the development of a Landscape Evolution Model (Section 10.1.7 of the RMP). On the completion of these projects MAC will update both the Rehabilitation Objectives and the TARP (Table 15 of the RMP). The intent is to have triggers and objectives that not just be re-active/remedial but predictive/preventative. Currently no change has been made to the RMP, however, MAC commits to developing measurable metrics for future RMP updates.
6	It is noted that the final voids are proposed to be Northern (not greater than 1050 ha and no deeper than 110 RL), McDonalds (not greater than 50 ha and no deeper than 156 RL), and Belmont (not greater than 50ha and no deeper than 158 RL). Council maintains ongoing concern with the enduring legacy of final voids, particularly as the water contained will become more saline over time and the design & final void slopes for the Northern Void would appear to present risks for pasture establishment and erosion, grazing by domestic and endemic animals, and human safety.	MAC notes and values Councils' feedback on final voids. MAC will ensure that the design and slope of any final voids will be engineered to ensure safe and stable landforms. No change has been made to the RMP.
7	Council Officers acknowledge that Mac have incorporated additional detail in the RMP compared to previous drafts, including the provision of information on analogue sites, in part as a consequence of previous consultation with Council. This is appreciated. Council Officers also note that the updates to the AFP and RMP were clearly highlighted, which is also appreciated.	MAC continues to value the feedback provided by Council.

Our ref: DOC21/521169-1
Your ref:

Mr Jonathon Deacon

Specialist Rehabilitation and Closure
Mt Arthur Coal
Hunter Valley Energy Coal Pty Ltd
Jonathon.deacon@bhp.com

Dear Mr Deacon

Mt Arthur Coal Mine Operations Plan FY22 – FY24 – Rehabilitation Management Plan

I refer to your letter dated 24 June 2021 in which the Mt Arthur Coal invited Biodiversity and Conservation Division (BCD) for advice in relation to the amended Mine Operations Plan (MOP) for the period FY22 to FY24 (July 2021 to June 2024). The amended document provided is 'MAC-ENC-MTP_052: Mount Arthur Coal: Forward Program'. The MOP has been prepared to meet Condition 44 of Project Approval MP09_0062. BCD understands that MOP has been amended to align with changes to rehabilitation requirements by the NSW Resource Regulator, including Completion Criteria, and to align with changes to mine planning.

BCD has reviewed the document, 'MAC-ENC-MTP_052: Mount Arthur Coal: Forward Program', including the 'Rehabilitation Management Plan: Mt Arthur Coal' (dated 21 June 2021). Please note that BCD's review has not been exhaustive.

BCD's recommendations are provided in **Attachment A** and detailed comments are provided in **Attachment B**. If you have any further questions in relation to this matter, please contact Robert Gibson, Regional Biodiversity Conservation Officer, on 4927 3154 or via email at huntercentralcoast@environment.nsw.gov.au

Yours sincerely

STEVEN CRICK
Acting Senior Team Leader Planning
Hunter Central Coast Branch
Biodiversity and Conservation Division

Date: 9 July 2021

Enclosure: Attachments A and B

Attachment A

BCD's recommendations

Mt Arthur Coal Mine Operations Plan FY22 – FY24 – Rehabilitation Management Plan

1. BCD recommends that Kikuyu (*Cenchrus clandestinus*) is not included in the pasture seed mix for the mine site.

2. BCD recommends that post-mine rehabilitation targeting specific plant communities results in recognisable, self-sustaining versions of those vegetation communities.

3. BCD recommends that topsoil containing exotic perennial grasses is treated so that those grasses are not introduced into areas on which native woody vegetation communities are to be re-established.

4. BCD recommends different seed mixes are made and used to generate recognisable versions of all of the targeted woody vegetation communities required by consent conditions.

5. BCD recommends that during annual monitoring that note is made of the presence, identity and abundance of key plant species that will affect the recognisability, resilience, structure and fauna resources from the post-mine rehabilitation.

6. BCD recommends that the selection of reference sites of remnant native vegetation is justified on how they are a meaningful target for factors including vegetation quality, previous site disturbance and similarity in environmental factors such as slope, hydrology and soils.

   BCD recommends that any deficiencies in analogue sites are identified and addressed by management actions to the post-mine rehabilitation.

7. BCD recommends that edits are made to the rehabilitation management plan so that the reader is able to clearly understand all aspects of the plan.

BCD's detailed comments

Mt Arthur Coal Mine Operations Plan FY22 – FY24 – Rehabilitation Management Plan

Biodiversity

1. BCD recommends that Kikuyu is not included in the pasture mix

Table 11 'Mt Arthur Coal Pasture seed mix' includes Kikuyu (*Cenchrus clandestinus*). This exotic grass is an aggressive and persistent species that will hinder woodland rehabilitation if it gets in there, which can readily occur from adjacent pasture rehabilitation areas. BCD therefore recommends that Kikuyu is not included in the pasture seed mix.

Recommendation 1

BCD recommends that Kikuyu (*Cenchrus clandestinus*) is not included in the pasture seed mix for the mine site.

2. Vegetation communities to be created by rehabilitation must be recognisable, self-sustaining versions of those targeted communities

Table 2 'Regulatory Requirements Related to Rehabilitation' refers to the eight vegetation communities targeted to be recreated by post-mine rehabilitation:

- Box-Gum woodland
- Upper Hunter White Box – Ironbark Grassy Woodland
- Central Hunter Box – Ironbark Woodland
- Central Hunter Ironbark – Spotted Gum – Grey Box Forest
- Narrabeen Footslopes Slaty Box Woodland
- Hunter Floodplain Red Gum Woodland Complex
- White Box – Yellow Box – Blakely's Red Gum Woodland, and
- Hunter Lowlands Red Gum Forest

The 'summary of status' states that 'species composition and structure reflects the communities mentioned in conditions 36 and 38(a) of PA 09_0062 MOD 1. BCD recommends that the criteria for determining that these communities have been established is for them to be recognisable, self-sustaining versions of those vegetation communities or else there is a risk that revegetation will create novel ecosystems.

BCD also recommends that the word 'recognisable' is added to the rehabilitation objective in Table 5 'Domain Species Rehabilitation Objectives' for the 'Native ecosystem – native woodland' domain, at the 'Area of native woodland' indicator (page 48).

Recommendation 2

BCD recommends that post-mine rehabilitation targeting specific plant communities results in recognisable, self-sustaining versions of those vegetation communities.

3. BCD recommends that topsoil used for rehabilitation areas does not contain perennial exotic grasses

Section 7.3.1 Active Mining: Topsoil Retention' (on pages 93 and 94) summarises the process of assessing and recovering topsoil for use in mine rehabilitation areas. There is no mention of an assessment of exotic perennial grasses in the area where topsoil is proposed to be collected from. If not covered by other, related documents, such as the 'BHP Coal Rehabilitation Manual' or the 'Topsoil Management Plan', then BCD recommends that topsoil containing Kikuyu, Rhodes Grass (*Chloris gayana*), African Lovegrass (*Eragrostis curvula*), Coolatai Grass (*Hyparrhenia hirta*) or *H. rufa* is treated so that all seeds and plant fragments are killed so that those grasses are not brought into areas to be rehabilitated to native woodland communities. These grasses tend to be long-lived, including as seed, and their establishment in woodland rehabilitation areas will hinder the growth and establishment of native woodland species, and may prevent rehabilitation objectives from being achieved.

Recommendation 3

BCD recommends that topsoil containing exotic perennial grasses is treated so that those grasses are not introduced into areas on which native woody vegetation communities are to be re-established.

4. BCD recommends that different seed mixes are used to recreate the different native woody vegetation communities

Table 12 'Mt Arthur Coal native woodland species list' is a generic mix of species that is at odds with the species composition of the seven vegetation communities to be recreated in accordance with consent condition 38(a) of PA 09_0062 MOD 1. BCD recommends that specific seed mixes are prepared for each of those seven targeted native woody plant communities (as has been done for Box – Gum woodland – given in Table 13), so that recognisable plant communities are produced to meet consent requirements; rather than novel ecosystems.

Recommendation 4

BCD recommends different seed mixes are made and used to generate recognisable versions of all of the targeted woody vegetation communities required by consent conditions.

5. BCD recommends that Ecological Development Monitoring checks for key species in revegetation mix that will guide vegetation structure and composition

Section 9.1.4 'Ecological Development Monitoring' describes the process of annual assessments of revegetation areas for the trend in the vegetation composition and structure, and fauna habitat resources. A general assessment may miss the presence of key species that will delay targeted vegetation communities or required fauna resources from being developed. BCD recommends that note is made of the presence, identify and abundance of:

- key canopy, shrub and groundcover species for each targeted vegetation community – these will determine recognisability of the created vegetation communities
- key species that will drive the structure of each targeted vegetation community

- plants of different life forms and life spans (particularly species of *Acacia*) – these will give a measure of resilience, and whether a mass die-off of short-lived species may be likely

- plants for specific fauna habitat resources, such as winter-flowering Eucalypts (such as *Eucalyptus albens* and *E. tereticoirnis*), or pinnate-leaved species of *Acacia*.

Recommendation 5

BCD recommends that during annual monitoring that note is made of the presence, identity and abundance of key plant species that will affect the recognisability, resilience, structure and fauna resources from the post-mine rehabilitation.

6. BCD recommends that analogue site selection is done carefully to provide an appropriate comparison for targeted vegetation communities

Section 10.2 'Analogue Sites' describes the process to identify and use references sites against which the compare revegetation to targeted vegetation communities. BCD recommends that this process is done with consideration of:

- the quality of the vegetation at the reference site (is it in good condition?)

- its history (is it likely to be missing key species, say the more palatable species, due to a long history of grazing? Do additional species need to be added to the rehabilitation?)

- its substrate (is it a good match to that on the post-mined landscape, such as vegetation communities from high nutrient, basalt-derived soils?), and

- its landscape position (does it have comparable hydrology?).

Recommendation 6

BCD recommends that the selection of reference sites of remnant native vegetation is justified on how they are a meaningful target, for factors including vegetation quality, previous site disturbance and similarity in environmental factors such as slope, hydrology and soils.

BCD recommends that any deficiencies in analogue sites are identified and addressed by management actions to the post-mine rehabilitation.

7. Edits are required to the rehabilitation management plan to make all details clearer for the reader

Several aspects of the rehabilitation management plan are not clear for the reader to understand. BCD recommends the following changes to the management plan to clarify how and where the proposed management will occur:

a) Figure 1 'Mining sequence from topsoil removal to rehabilitation' has text that is not legible when the file is viewed at 100%. BCD recommends that the Figure is replaced with a version at higher resolution, so that all of the details are available to the reader

b) The report lists several places on the mine site, such as Section 1.2.4 'Overburden Emplacement', but these are not shown on any map. BCD recommends that a map, or maps, are prepared that clearly show where all of the places named in the report are located

c) The citation link in the Figure 7 ‘Ecological Development Monitoring Sites’ in the Table of Contents (for the Rehabilitation Management Plan), and in the first paragraph of Section 4.1 ‘Three Yearly Forecast Cumulative Disturbance and Rehabilitation Progression’ (in the section proceeding the Rehabilitation Management Plan) have not worked. BCD recommends these are linked to within the document so the document works as intended

d) Add the definition of ‘Bank cubic metres’ to Section 1.3 ‘Definitions’ of the Rehabilitation Management Plan

e) The colour ramp of Figure 3 ‘Pre-Mining Environment – Natural Environment’ includes similar shades of purple and grey which are hard to link to the vegetation communities in the Legend. Figure 4 ‘Pre-Mining Environment – Built’ has three very similar shades of purple to red that are difficult to confidently identify on the map. BCD recommends that different colour ramps are used to enable the reader to easily identify the features in the legend on the mapped area

f) References to the Office of Environment and Heritage (OEH) in the document, where not citing historical documents, needs to be changed to Department of Planning, Industry and Environment: Biodiversity and Conservation Division (BCD) (such as Section 3.4 ‘Stakeholder Consultation’, and

g) Check for missing details in Section 7.3.5 ‘Ecosystem and Land Use Establishment’: - ‘Section 0’ (second paragraph on page 101), ‘…that a valuable isn’t wasted…’ (second last paragraph, page 101).

Recommendation 7

BCD recommends that edits are made to the rehabilitation management plan so that the reader is able to clearly understand all aspects of the plan.

Deacon, Jono

From: no-reply@majorprojects.planning.nsw.gov.au
Sent: Tuesday, 29 June 2021 9:25 AM
To: Deacon, Jono
Subject: Mt Arthur Open Cut Extension Mining Operations Plan - Response from NSW Resources Regulator

NSW Resources Regulator has responded to your request for advice in relation to the Mt Arthur Open Cut Extension Mining Operations Plan . The response is below and/or attached. Record of this consultation has been automatically saved to the portal.

When you are ready, login to your profile to submit the final document to the Department.

Public Authority Response
No comment. The final MOP will be submitted to RR for review/approval.

To sign in to your account click here or visit the Major Projects Website.
Please do not reply to this email.

Kind regards

The Department of Planning, Industry and Environment

Subscribe to our newsletter

Deacon, Jono

From: Alex Newton <anewton@malabarresources.com.au>
Sent: Thursday, 1 July 2021 3:53 PM
To: Nixon, James
Cc: Donna McLaughlin
Subject: RE: Mt Arthur Coal MOP Consultation - Malabar

Jimmy,
Thanks for the opportunity, please see below our comments.

1) References to the sublease are the "Maxwell Infrastructure (Drayton) Sublease area". Suggest the sublease be defined as "the Sublease" and then use that term throughout the document. For the record we own the lease, but MAC has full control of the area and responsibility for the area. Example below:

Spontaneous combustion at Mt Arthur Coal is predominantly confined to old mining areas in tl
and the Maxwell Infrastructure (Drayton) sublease area. This is a result of the higher levels of
the coal seams mined from the Greta measures, compared to those mined in the former Bays
Arthur North mining areas (Wittingham measures). Management of spontaneous combustion

2) The conveyor corridor is NOT between Mt Arthur and Maxwell. It is internal to Mt Arthur's operations. See below

2.2 Current Consents, Leases and Licences

~~Extract from the code.~~ Under the mining lease conditions, the lease holder must have the follov
the Rehabilitation Management Plan approved by the Minister: the Rehabilitation Objectives an
Criteria (Part 5); and, the Final Landform and Rehabilitation Plan (Part 6). The remaining comp
Rehabilitation Management Plan do not require approval but must still be provided as they com
context for assessing the Rehabilitation Objectives and Completion Criteria, and the Final Land
Rehabilitation Plan. The remaining components must be prepared to the satisfaction of the Min

Details on Mt Arthur Coal's existing statutory approvals as at ~~March 2020~~May 2021 are provide

The Modification Project includes the following key components:

- a four year continuation of the open cut mine life from 2022 to 2026 at the currently approv
  32 Mtpa;
- an increase in open cut disturbance areas;
- use of the existing conveyor corridor between Mt Arthur Coal and Maxwell Infrastructure fo
  emplacement;
- duplication of the existing rail loop;
- an increase in the maximum number of train movements per day from 24 to 30;
- the relocation of the load point for the overland conveyor which delivers coal to Macquarie

3) Figure 1 excludes the boundary of sublease of CL229 and should be included. The reason is not that the Project Approval boundary overlays the sublease, as the boundaries are not entirely coincident.

Kind regards,
Alex

Alex Newton
Environment and Approvals Coordinator

MALABAR

anewton@malabarresources.com.au
M +61 4 8875 9487
Thomas Mitchell Drive
Muswellbrook, NSW 2333 Australia
www.malabarresources.com.au

From: Nixon, James <james.nixon@bhp.com>
Sent: Thursday, 24 June 2021 1:33 PM
To: Donna McLaughlin <dmclaughlin@malabarresources.com.au>
Cc: Deacon, Jono <Jonathon.Deacon@bhp.com>
Subject: Mt Arthur Coal MOP Consultation - Malabar

Hey Donna,
Hope you are well.
Please find attached the updated Mt Arthur Coal Mine Operations Plan for Malabar's consideration. Please provide any comment by **8 July 2021** to allow time for HVEC to make updates and to provide a final submission to the Resources Regulator for the approval.
If you have any questions please give me a call.

Cheers,
Jimmy

BHP

James Nixon
Superintendent Environment
NSWEC | Mt Arthur Coal | Health Safety and Environment
James.Nixon@bhp.com
M +61 487 343 968
Thomas Mitchell Drive
Muswellbrook NSW 2330 Australia

bhp.com

Deacon, Jono

From: Sharon Pope <Sharon.Pope@muswellbrook.nsw.gov.au>
Sent: Tuesday, 13 July 2021 4:10 PM
To: Nixon, James
Cc: Deacon, Jono; Bailey, Sarah; Fiona Plesman
Subject: Mt Arthur Coal MOP Consultation Request - Muswellbrook Council

Hello Jimmy

Thank you for providing Council will an updated version of the Annual Forward Program and the Rehabilitation Management Plan. Our feedback is provided below, usually by including the relevant section from the AFP or RMP and then an Officer comment, as follows:

Annual Forward Program

1.2.2 Construction
The construction of a deployment facility to the western side of the main pit which including carparks, change rooms, crib huts, ablutions and office buildings.

Is it intended that these facilities be accessed from Thomas Mitchell Drive, Denman Road or Edderton Road? Current approvals may limit access to Thomas Mitchell Drive, this should be checked.

1.2.4 Overburden Emplacement
With the exception of the tailings emplacement expansion walls, these emplacement areas are designed by mine planning engineers. The extended tailings emplacement walls were designed by an external consultant.

It would be preferable that this section be reworded slightly to relate back to the conditions of consent and Rehabilitation Management Plan:

> With the exception of the tailings emplacement expansion walls, these emplacement areas will be designed by mine planning engineers and the extended tailings emplacement walls will be designed by an external consultant to ensure they will achieve the objectives in Table 14. Schedule 3, Condition 41A and in section 4 of the approved RMP.

4.1 Three Yearly Forecast Cumulative Disturbance and Rehabilitation Progression
Table 2: Predicted cumulative disturbance and rehabilitation progression during the next 3-year term

Year	Total Disturbance Footprint - Surface Disturbance (ha)	Underground mining area (ha)	Total Active Disturbance (ha)	Rehabilitation Land Preparation (ha)	Ecosystem & Land Use Establishment (ha)
End FY22 (30 Jun 2022)	5589	0	4506	43	43
End FY23 (30 Jun 2023)	5702	0	4643	69	69
End AFP (30 Jun 2024)	6060	0	4960	96	96

Council Officers note that the trend to an increase in the total area of active disturbance over the next 3 years. This is a concern give the current approval for coal extraction expires in 2026, the result being that most rehabilitation will only commence once extraction ceases, which present a number of potential risks. Council Officers support a review of the calculation of the rehabilitation cost estimate following approval of the AFP to ensure the bond held by DPIE is sufficient to complete rehab works in a timely manner if necessary.

Rehabilitation Management Plan

4. Rehabilitation Objectives and Completion Criteria

It is noted that MAC are only committing to natural landforms for landforms created after 26 September 2014. Council maintains ongoing concern with the visual impact of earlier landforms that are highly visible from the Muswellbrook Township and public roads/places.

It is noted that the proposed indicator for successful management of erosion of the final voids landforms (and the other landforms as well) is the establishment of not less than 50 % groundcover. MAC has previously said it is difficult to find a metric to use for measuring erosion management success other than % groundcover. However MAC staff inspect rehab areas following significant rainfall and schedule repairs when erosion rills form in the various landforms. Likewise Resources Regulator staff would be asking for action to repair obvious erosion after they complete site audits/inspections. This indicates that there must be a quantifiable metric in use to trigger action.

Council's suggested metrics are:

> Establishment of not less than 50 % groundcover and no erosion rills exceeding a depth or width of 100 mm.

It is noted that the final voids are proposed to be Northern (not greater than 1050 ha and no deeper than 110 RL), McDonalds (not greater than 50 ha and no deeper than 156 RL), and Belmont (not greater than 50ha and no deeper than 158 RL). Council maintains ongoing concern with the enduring legacy of final voids, particularly as the water contained will become more saline over time and the design & final void slopes for the Northern Void would appear to present risks for pasture establishment and erosion, grazing by domestic and endemic animals, and human safety.

Council Officers acknowledge that Mac have incorporated additional detail in the RMP compared to previous drafts, including the provision of information on analogue sites, in part as a consequence of previous consultation with Council. This is appreciated.

Council Officers also note that the updates to the AFP and RMP were clearly highlighted, which is also appreciated.

Council appreciates the opportunity to comment and would be pleased to provide additional information if requested.

Regards

Sharon Pope | Executive Manager Environmental and Planning Services |
Muswellbrook Shire Council
T: 02 6549 3868 **I E:** Sharon.pope@muswellbrook.nsw.gov.au **I** www.muswellbrook.nsw.gov.au

Note **The Muswellbrook Council Administration Centre has moved to**
Campbell's Corner 60-82 Bridge Street Muswellbrook NSW 2333

From: Nixon, James <james.nixon@bhp.com>
Sent: Thursday, 24 June 2021 1:32 PM
To: Fiona Plesman <Fiona.Plesman@muswellbrook.nsw.gov.au>; Muswellbrook Shire Council <council@muswellbrook.nsw.gov.au>
Cc: Deacon, Jono <Jonathon.Deacon@bhp.com>; Bailey, Sarah <sarah.k.bailey@bhp.com>
Subject: Mt Arthur Coal MOP Consultation Request - Muswellbrook Council

Good afternoon Fiona,
Please find attached the updated MAC Mine Operations Plan (MOP) and associated letter for MSC's consideration. As per the letter we request that MSC provide any comment by **8 July 2021** to allow time for HVEC to make updates and to provide a final submission to the Resources Regulator for the approval.
The MOP has also been uploaded to the DPIE portal under MSC as a relevant authority.

If you have any questions please give me a call.

Cheers,
Jimmy

BHP

James Nixon
Superintendent Environment
NSWEC | Mt Arthur Coal | Health Safety and Environment

James.Nixon@bhp.com
M +61 487 343 968
Thomas Mitchell Drive
Muswellbrook NSW 2330 Australia

bhp.com
