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15 July 2019

Peter Ainsworth
Manager Environmental Operations
Resources Regulator
516 High Street
PO Box 344
Maitland NSW 2320

Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear Peter,

Hunter Valley Energy Coal Pty Ltd (HVEC) will be submitting an amendment of the Mine Operations Plan (MOP) for the Period FY20 – FY22 (July 2019 – June 2022) to the Resources Regulator. The MOP similarly satisfies the requirement of Condition 44 of the Project Approval No. 09_0062 (as modified on 26 September 2014) (Project Approval) for a Rehabilitation Management Plan.

We are pleased to provide the comments below in response to your letter email entitled "Mt Arthur Submission Comments" and dated 9 July 2019. Also comments in response to the Resources Assessments team for your information have been included in Tables 1 Rehabilitation Management Plan and Table 2 Forward Program below.

HVEC will continue to work with DPE to update and improve the Rehabilitation documentation and processes.

Please do not hesitate to contact me on 0429186152 or at luke.l.neil@bhp.com.

Regards,

Luke Neil
Principal Environment Analysis and Improvement
BHP Minerals Australia

Table 1. Rehabilitation Management Plan comments

DPE Resource Regulator Comment on RMP	BHP Response
Risk Assessment	
Current draft RA refers to project environmental risk assessment for EIS. Proposed new mining lease conditions require a *specific rehabilitation risk assessment* to be carried out for each RMP submission, and records to be maintained to demonstrate compliance.	The Project Approval Risk assessment is still a valid risk assessment and does capture the main rehabilitation risks. Risk assessments are also done annually at MAC and are available on request. The risk assessment domain and controls are shown in table 11 and align with table 12 TARP section of the RMP.
There must be clear linkage between identification of unwanted risk events / controls / rehab implementation discussion. Mandatory requirement of the Code is to present in a table risks and controls. Current text sections in the	The rehabilitation risks are all discussed in the RMP, but HVEC agree they can be moved into a table to make the risk and control links simpler to read. HVEC

MAC RMP is unnecessary, particularly text referring to other management plans.	propose to develop a suitable table for the next revision of the RMP in consultation with DPE.
Guidance for the scope of the risk assessment and appropriate controls to be included in the required table are provided in *Guideline: Rehabilitation Risk Assessment* and *Guideline: Controls*	Noted by HVEC
Rehabilitation Objectives and Completion Criteria	
Text in section 5.1.1 - 5.1.3 is all unnecessary. (We should consider how we 'influence' industry to strip this kind of 'MOP' content out of the RMP). The mandatory requirement is to provide only the RO &CCs in a table.	HVEC agree and will reduce this content. Some of the criteria and objectives were added in specifically at request by DPE as required in the last revision of the Rehabilitation Strategy. HVEC agree that there is an opportunity to make some of these more quantitative. This will take more than a few days to change, so we propose to update for the next version.
RO&CC do not comply with SMART criteria as per examples in Appendix 2. CC are mostly generic and not quantifiable. There appears to be a misunderstanding regarding the definition of CC and indicators. Below is an explanation you can provide MAC and examples I have written using info that is actually in sections of the MAC RMP. REHABILITATION OBJECTIVES that describe the desired features and/or characteristics of the final land use domain INDICATORS that are specific attribute associated with the objective COMPLETION CRITERIA (benchmark for the indicator, based on analogue data where appropriate) VALIDATION METHOD such as monitoring, engineer report , survey	HVEC used the template provided by the Resource Regulator about 18 months ago for the objectives and criteria. It sounds like remodelling Table 11 to align with the definitions to the left would help meet the SMART criteria. HVEC will develop an updated SMART criteria in consultation with the Department for addition to the next version of the RMP.
DPE Resource Assessments Comment on RMP	**BHP Response**
The Department considers that the Rehabilitation Management Plan would benefit from further description of the measures to be implemented to integrate Biodiversity Offset Areas with rehabilitated woodland communities, particularly at the boundaries between these two areas.	The BMP is a more suitable document for this content, and which currently states the following: Integration of the offset strategy and rehabilitation areas will be achieved through the design of woodland corridors which will directly link vegetation in Thomas Mitchell Drive Offset Areas, Mt Arthur Offset Area, Saddlers Creek Offset Area and Edderton Road Revegetation Area (Figure 1). These woodland corridors will also link offset areas to remnant woodland areas to east of the MAC Complex, including the Drayton Wildlife Refuge (located to the north of Thomas Mitchell Drive and Drayton Coal Mine). • Revegetation; • Weed control; • Pest animal monitoring and control; • Fire management; • Fencing; and • Monitoring and reporting.
The Department notes that the Annual Rapid Assessment (ARA) is due within 3-6 months of rehabilitation establishment. Please clarify the definition of “rehabilitation establishment”, in order to make it clear when each ARA is due.	Rehabilitation establishment should be ecosystem establishment phase and in this case means post seeding. HVEC will update in the RMP
The Department notes the company’s rehabilitation monitoring program (Section 9) and use of an ARA. The Department considers it would	Monitoring is conducted annually, which is stated in section 10 of the RMP.

be beneficial to provide timeframes and actions that constitute monitoring established rehabilitation and an overview of the characteristics that constitute post-rainfall event inspections.	Also shown in the RMP below are the characteristics monitored: • Effectiveness of contours (if present); • Identification and evaluation of any area of active/potential erosion; and, • Rapid assessment of newly established rehab for groundcover percentage to determine if future monitoring is required under this program
The Department notes the proposed research includes rehabilitation monitoring, as mentioned in Section 11.1. Please identify the expected commencement/completion dates, in relation to current and future rehabilitation trials.	This has been updated. Monitoring of the rehabilitation progress through the phases has been ongoing at MAC. The Monitoring is proposed to be increased and expanded as the rehabilitation increases across site. MAC is working with a consultant to update and improve the monitoring across MAC. The monitoring improvements will be available in the next version of the RMP, proposed for update by 30 June 2020.
Please provide higher resolution figures for Figures 7 and 8	Updated figures in final RMP version

Table. 2 Forward Program Comments

DPE Resource Regulator Comment on Forward Program	**BHP Response**
General: MAC appear to have just provided the components of a Forward program that describe forecast rehab as per the current MOP section 7. The forward program entirely omits: 1. Rehab planning (further development of closure planning, any stakeholder consultation etc) 2. Rehab trials and research programs	Section 2.1 shows what rehabilitation activities are planned. Rehab trials and research programs are shown in the RMP as required by the draft RMP guidelines provided to HVEC. ? Stakeholder consultation is attached to the RMP including HVEC responses.
Feedback for site is that following implementation these sections should be included and aligned to the RMP LoM Rehab Schedule so that RR can assess adequacy of planning activities to meet progressive rehab commitments for the project.	A rehabilitation schedule is provided in Figure 9 of the RMP. The Planned activities for rehabilitation are listed in the rehabilitation schedule section of the Forward Program.
S2.2 Table 2. is a very clear and succinct summary of rehab maintenance activities. Going forward it could be improved by linking the actions to monitoring reports/QA inspection recommendations, and indicating if any actions are triggered from TARP thresholds to improve transparency regarding the decision making processes behind the nominated actions.	Currently the annual monitoring generates recommendations for stability, erosion and flora and fauna, and these are added to the rehabilitation schedule. The monitoring is reported on in the AEMR. HVEC is working with a consultant to improve the reporting link to the criteria and TARP and this improvement will be added to the next version of the RMP
Plans and rehab stats do not comply with the Code however this will be addressed by amending the data submission as per Will's comments below	Noted by HVEC
Spatial Data Submission	
Disturbance – DistYr (Disturbance Year) should be the year that disturbance first occurred within that polygon area. This is particularly important for the KPI report as it is picking up that there was over 7000 hectares of disturbance in 2019 as all polygons have a disturbance year of 2019	To be updated to the portal
Forecast Themes – Currently supplied as total disturbance plus forecast disturbance. This is not correct. Forecast data should reflect forecast new areas of Disturbance, Land Prepared for Rehabilitation and Ecosystem and Land Use Establishment. These polygons should only show planned new areas under these three categories	HVEC will update to the portal.

i.e does not include existing disturbance areas. Updates have been made to the guidelines to make the expectation clearer, as below. Note: we will be removing the word (Total) from Forecast disturbance as this is misleading. ○ Forecast Disturbance (total) ▪ This is the new disturbance areas for the forecast year i.e. land/vegetation clearing etc. ○ Forecast Land Prepared for Rehabilitation ▪ Areas where works are planned be undertaken in the following rehabilitation phases: Decommissioning, Landform Establishment, and Growth Media Development. ○ Ecosystem and Land Use Establishment ▪ Areas where works are planned be undertaken in the following rehabilitation phases: Ecosystem and land use establishment i.e. vegetation establishment (seedling/planting) initiated.	
• Rehabilitation – No issues • Final Land Use – No issues • Final Landform Contours – No issues	Noted
DPE Resource Assessments Comment RMP	**BHP Response**
The Department notes the estimated completion dates included within Table 2 (Section 2.2). The Department considers it would be beneficial to provide the frequency, estimated duration and completion dates for all proposed activities.	The schedule is deliberately designed to allow some flexibility in the finish date due mostly for weather, but also due to actual finish date for shaping of emplacements and availability of machinery. Considering the large scale and nature of the rehab these date ranges are suitable. Hovever HVEC will work with RR to improve for the next version of the Forward Program.
Please identify the units of measurements in Tables 3 and 4.	Hectares added to the table

MAC-ENC-MTP-000

BHP

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. From this point on the MOP will be referred to as the Annual Forward Program (AFP) and the Rehabilitation Management Plan (RMP). The AFP is prepared in accordance with the mandatory requirements of this Code to the satisfaction of the Minister and requires the Minister's approval. The Mt Arthur Coal Annual Forward Program meets requirements of Part 4 of the Code of Practice: Annual Rehabilitation Report and Forward Program for Large Mines.

Mt Arthur Coal Mining Operations Plan	
Name of Mine	Mt Arthur Coal
Commencement Date	1 July 2019
Completion Date	30 June 2022
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, CL 229, CL 335, ML1757, ML1739
Name of Authorisation Holder	Hunter Valley Energy Coal Pty Ltd
Name of Authorisation / Title Holder(s):	Hunter Valley Energy Coal Pty Ltd
Name of Mine Operator:	Hunter Valley Energy Coal Pty Ltd
Name and Contact Details of the Mine Manager (or equivalent):	David Boshoff, General Manager Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Ph: 02 65445566 Email: David.Boshoff@bhpbilliton.com
Name and Contact Details of Environmental Representative:	Luke Neil, Principal Environment, BHP 480 Queen St Level 14 Brisbane 4000 Ph: 07 33192193 Email: Luke.L.Neil@bhpbilliton.com
Name of Representative(s) of the Authorisation Holder(s):	
Title:	David Boshoff
Signature:	
Date:	4/7/19
Version 2.0 – June 2019	Mt Arthur Coal - Forward Program FY20 – FY22

Mt Arthur Coal: Forward Program

Key contact

Action	Person	Title
Rehabilitation Planning	Damien Perkins	Manager Schedule Planning
Rehabilitation Governance	Kris Sheehan	Superintendent Health Safety and Environment
Document Owner	Rob Pascoe	Superintendent Tactical Planning
Document Approver	David Boshoff	General Manager

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Intent

The intent of this Mining Operations Plan (AFP) is to allow continued mining operations at Mt Arthur Coal, following the changes to the development consent associated with the granting of approval for the Mt Arthur Coal Modification Project PA 09_0062 MOD 1. This AFP provides information pertaining to operating philosophy, mining method, 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;
- an Aboriginal heritage impact permit under the National Parks and Wildlife Act 1974;
- licences or approvals under the Water Management Act 2000 or the Water Act 1912, for activities or works that take, divert or use water;
- approvals under the Heritage Act 1977 for the management of heritage items associated with an operation; 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.

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
AEMR	Annual Environmental Management Report
AHMP	Aboriginal Heritage Management Plan
BCM	Bank cubic metres
BMP	Biodiversity 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
DA	Development approval
DoEE	Federal Department of the Environment and Energy
DP&E	NSW Department of Planning and Environment
DRG	NSW Department of Planning and Environment - Division of Resources and Geoscience

EA	Environmental Assessment
EL	Exploration licence
ELA	Exploration Licence Authorisation
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
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
ML	Mining lease
MOP	Mining Operations Plan
MPL	Mining purpose lease
MSC	Muswellbrook Shire Council
Mtpa	Million tonnes per annum
NGO	Non-government organisation
NOW	NSW Office of Water
NSW	New South Wales
OEH	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

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 09_0062 MOD 1 Mt Arthur Coal Mine – Open Cut Modification Project dated 26 September 2014.
- **The Annual Forward Program -** is prepared in accordance with the mandatory requirements of Part 4 of the Code of Practice: Annual Rehabilitation Report and Forward Program for Large Mines.
- **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. The RMP also meets the requirements for Code of Practice: Rehabilitation Management Plan for Large Mines.

1 Three year mining activities forecast

1.1 Project Description

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 Plan 1A.

Mt Arthur Coal 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 sale on both export and domestic markets. A minor proportion of coal bypasses washing, for domestic contracts. Mt Arthur has development consent approval to operate until 30 June 2026. The general sequence and staging of mining operations over the life of the operation will be consistent with the methods described in Section 2.3.

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 the following website http://www.bhpbilliton.com/environment/regulatory-information.

1.2 Description of Activities

1.2.1 Exploration

Exploration activities will include a combination of airborne electromagnetic (EM) survey, Envirovibe – seismic surveys and exploration drilling. Envirovibe – seismic surveys are a minor ground disturbing activity, unlike traditional seismic exploration. This type of survey does not require vegetation removal or blasting. The vibration levels generated are significantly below Mt Arthur Coal's current vibration approval limits. The Envirovibe - seismic exploration is done by driving a soft wheeled vibration vehicle across the ground, and hand placed geophones are used on the surface to collect data. the Envirovibe process has been discussed with the Resource Regulator to ensure understanding of the non-invasive manner of this process.

An exploration drilling program will be undertaken on a campaign basis and subject to operational requirements throughout this AFP period. All exploration boreholes will be drilled on land owned by Mt Arthur Coal, following ecological and cultural heritage (Aboriginal and European) due diligence inspections. A program to monitor and rehabilitate existing boreholes will continue during this AFP period. Boreholes that are yet to be rehabilitated will be capped progressively.

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 sediment control structures required for the operation of the Conveyor Corridor Overburden Emplacement Area.

- The realignment of power lines and substations will occur within the AFP period. This includes both power lines owned by AusGrid and Mt Arthur Coal.
- The relocation of the explosives facility to the West of the pit highwall will occur in the AFP period.
- The construction of a deployment facility to the North Western side of the main pit which will include carparks, change rooms, crib huts, ablutions and office buildings.
- The Edderton Road construction pad, currently located adjacent to the Windmill/Huon Pit high wall, will be relocated to the South. A new access road off Edderton Road will be constructed to service this pad.
- A new overburden emplacement area (South-west Overburden Emplacement Area) and haul road will be constructed in this AFP period.
- The continuation of the construction of the Tailings Storage Facility (TSF) lift.
- The demolition of the disused Bayswater Infrastructure Area, which will occur towards the end of the AFP period dependent on the need for tailings expansion.
- Decommissioning of the Main Dam will continue during this AFP period.
- Additional water pipelines and pumps to support ongoing water management strategies will be installed during this AFP period.
- Upgrades to existing telecommunications infrastructure on-lease and off-lease will occur during this AFP.
- Additional fix and mobile telecommunications infrastructure will be installed during this AFP period.
- The approved realignment of Edderton Road and its intersection with Denman Road, which includes the extension of the existing alluvial cut off wall, the relocation of power lines, water infrastructure and the construction of water/sedimentation dams.
- Additional mine infrastructure as part of ongoing upgrades consisting with existing approvals including fill stands and maintenance pads will be constructed within this AFP period.
- The drilling of additional groundwater monitoring bores and the installation of monitoring equipment.
- Closure and capping of the North cut tailings dam as a project combined with Main dam and Dam 4 will continue in the AFP period.

1.2.3 Mining Operations

During FY 19 mining occurred in the Macleans, Windmill, Huon, Calool, Roxburgh, and Ayredale pits. Overburden was placed on the conveyor corridor, CD areas, VD areas and Macleans emplacement areas.

During this three year term, approximately 79 million tonnes of ROM coal has been identified for recovery using truck and shovel and/or excavator mining method for an equivalent 56 million tonnes of product coal. This method is consistent with current and previous site open cut operations.

The disturbance proposed for this AFP period are located within the EA disturbance boundary, as approved under the Mt Arthur Coal Open Cut Modification Project Approval 09_0062 MOD 1. During this AFP period, mining is proposed to continue within the extended pit shells of Saddlers Pit, and the North Pit. North Pit is an amalgam of constituent pits, consisting of:

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

During this AFP period, coal will be mined from the Arrowfield, Bowfield, Warkworth, Mount Arthur, Piercefield, Vaux, Broonie, Bayswater, Wynn, Edderton, Clanricard, Bengalla, Edinglassie, Transional, and Ramrod Creek coal seams. Beyond this AFP term, open cut coal reserves still remain at the Saddlers Pit and North Pit area.

The mine design has maximised the recovery of open cut resources from available areas. Future mining potential of underground resources is not adversely affected by activities proposed as part of this AFP. Open cut mining activities proposed under this AFP have been planned in conjunction with the long term engineers to maximise both the net present economic value of both open cut and potential underground resources and the recovery of open cut and underground marketable reserves into the future. An underground exploration adit was mined during previous AFP periods. The adit has been sealed and no coal recovery via underground mining methods will be undertaken during this AFP period.

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 of nominal 350-tonne and 206-tonne capacities. 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 with the assistance of dozers and front-end-loaders. The ROM coal extracted is delivered by haul trucks of nominal 157-tonne capacity 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 and conveyor.

The general sequence of mining used at Mt Arthur Coal is shown in Figure 1.

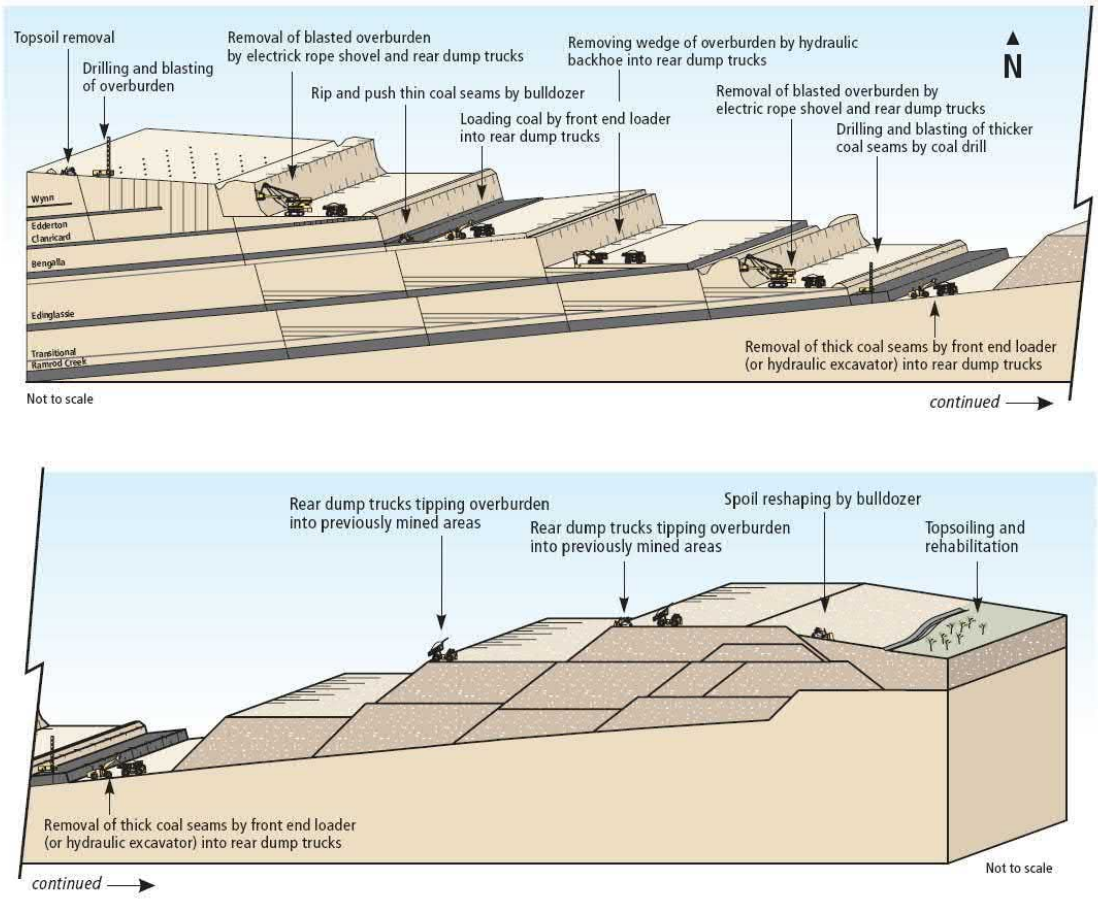


Figure 1: Mining sequence from topsoil removal to rehabilitation

1.2.4 Overburden Emplacement

During this three year term approximately 442 million bank cubic metres of overburden has been identified for transportation and placement by rear dump trucks. Emplacement areas are generally located within the open cut pit shell on the low wall side of the active pit. However in year 3 there will be increased movement to HW (OP1S 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);
- Out of Pit Dump (OP1S) (Previously known as southwest Overburden emplacement area)
- Tailings Emplacement Expansion walls;
- Conveyor Corridor Overburden Emplacement Area;
- Drayton Void Overburden Emplacement Area; and

In-pit overburden placement may occur in the Ayredale Pit during this Forward Program period. This includes an area of overburden emplacement currently being used as infrastructure in Ayredale north.

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 Mt Arthur surveyors, 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) emplacements approximate level of RL 375m to create visual relief. Emplacement design and construction also incorporates hostile material management considerations.

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 or stockpiled and transported by conveyor to the nearby Bayswater power station.

Approximately 23 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, road or other infrastructure. Fines (tailings) will continue to be pumped from the CHPP to the existing West Cut Tailings Dam (WCTD) for approximately 12 months. Pumping of tailings into a void to the east of the dam, known as East Pit commenced in 2013. Tailings deposition in East Pit and WCTS will continue for this AFP period. These tailings emplacements are shown in Plan 2 and are planned to be expanded in the second half of this AFP period as discussed in Section 2.

In February 2012, Mt Arthur Coal received approval from the DRG for the expansion of the existing tailings storage facility to an elevation of RL 280m AHD for the continued emplacement of tailings. The tailings dam expansion project involves the construction of two cross-valley embankments and a series of rim embankments. Cross-valley embankment design incorporates a compacted weathered layer, backed by an overburden layer, to ensure required levels of permeability as per relevant DRG approval.

Construction commenced in 2012 and will be completed in four stages over a 20-30 year period. Stage 1 (raising dam to RL 235m) involved the placement of 4,000,000 m3 of material and was finalised in 2013. Construction of Stage 2 is planned for this AFP with Stages 3 & 4 being constructed subsequently outside this AFP timeframe.

1.2.6 Waste Management

Mt Arthur Coal'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 Mt Arthur Coal'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 FY19 (July 2018 – June 2019)	Year 1 FY20 (July 2019 – June 2020)	Year 2 FY21 (July 2020 – June 2021)	Year 3 FY22 (July 2021 – June 2022)
Topsoil Stripping	kBCM	284	489	285	119
Prime Rock/ Overburden	kBCM	140,945	144,851	155,819	146,851
ROM Coal	Mt	25.2	26.7	27.0	27.3
Reject Material	Mt	7.3	7.9	7.7	7.5
Product	Mt	18.0	18.8	19.4	19.9

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).

Prior to the current AFP period, a risk evaluation was completed for the Main Dam, which was the main component of the site water network. Following this review it was decided to decommission the dam and re-route mine water to the CHPP Dirty Water dam. The Drayton Void, along with Ayredale, Belmont and MacDonalds and Saddler's 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. Tailings dams SP1, SP2 and SP3 have been decommissioned and capped, and will be further covered by the expanded footprint of the tailings dam expansion project. The North Cut Tailings Dam has been decommissioned and capping of the dam is expected to commence during this AFP period. Capping design is currently being completed by an experienced tailings consultant, and capping project timings will be scheduled following design finalisation.

The new reduced foot print of Stage 2 of the tailings dam will not remove the Bayswater No.2 facilities, however some minor demolition / removal of old dispatch buildings and car parks not associated with the main workshops and plant area will still occur. Removal of the Bayswater No.2 facilities will likely occur at stage 3 of tailings expansion. The footprint of the expanded tailings dam will engulf the complete area of the decommissioned facilities area during stage 3. A remedial action plan (RAP) has been completed and approved by the DP&E as required in PA 09_0062 MOD 1.

Decommissioning of the Main Dam will continue during this AFP period.

2 Three Year Rehabilitation Forecast

2.1 Rehabilitation Planning Activities

During this three year period, Mt Arthur Coal will continue to implement the programs contained in the site Rehabilitation Strategy, Rehabilitation Management Plan, Rehabilitation and Ecological Monitoring Procedure (REMP) and Biodiversity Management Plan (BMP).

Supplementary planting of existing pasture rehabilitated areas with native woodland species will also be undertaken during this AFP period, with the aim of expanding 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 during the AFP period, including:

- Rehabilitation and ecological monitoring;
- Detailed soil assessments of existing rehab to track the development of soil profiles and feed into understanding of what rehab has been successful;
- Weed assessments to enable more targeted weed control. Trials in advanced weed assessment using aerial imagery will take place;
- Weed control trials will also take place investigating 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 will occur dependant on 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).

2.2 Rehabilitation Schedule

The estimated schedule for existing rehabilitation maintenance and ongoing improvement works are detailed in Table 2. Although all these activities are planned to be done in the next three years they are dependent on weather and completion of emplacements to be ready for rehabilitation and therefore should be used as a guide.

Table 2: Rehabilitation activity schedule

Area		Item	Notes	Estimated completion
1. All areas	1.1	Kangaroo Management	Kangaroo harvesting risk assessment completed and harvesting commenced in April 2019. Work will be ongoing with plans to expand based on safety considerations.	Ongoing
	1.2	Rabbit Management	The first round of a baiting program has been completed. Scoping of excavation of burrows has identified that the majority are in sensitive locations and would require clearing so this has been postponed indefinitely Rabbit trapper has been on boarded. Rabbit trapping scheduled to commence in June 2019.	Ongoing
	1.3	Replace hand sowing	Some areas too steep for tractor mounted seeding. UAV operators capable of aerial seeding have been on boarded with works being scoped.	Trials to be completed in FY19
	1.4	Characterisation of rehabilitation materials be completed prior to use.	Soil sampling will be conducted across stripped topsoil, topsoil stockpiles and older rehabbed areas as an ongoing basis. This will be recorded in an update to MAC's Land Management Procedure to be completed by December 2019.	Ongoing

Area		Item	Notes	Estimated completion
1. All areas	1.5	Use successful examples from around site to identify what rehabilitation treatments and methods work best at MAC and develop standard practice.	Improvements in tracking of rehabilitation practices is required to implement this action. Proposed use of graphical representation is being assessed. See item 1.4 for procedure update.	New spatial tracking system to be commenced in June 2019.
	1.6	Weed treatment	Weed assessment completed and weed works commenced. Ongoing work across the whole site. Areas will be prioritised based on details given bellow.	Ongoing
	1.7	Mulching	Ongoing review will be used to determine placement in future. Remedial works are dependent on ongoing soil sampling and update of MAC's ESCP.	Initial application of mulch or equivalent to be completed by end of August 2019.
	1.8	Contour drain removal	Work will be rolled out across site following execution of VD1 work. This will allow lessons learned to be effectively implemented.	Dependent on scope completion and review of VD1 work.
	1.9	Translocation of key species	Identify key species in pre-strip areas and commence trials in translocating them	Autumn 2020
	1.10	Review QA/QC procedures.	QA/QC processes assigned to relevant personnel	Assignments complete, review to be ongoing
2. VD1	2.1	Excavate soil from the sediment dam at VD1 to re-establish its design functionality.	Rock drains to be re-worked to improve erosion outcomes this financial year.	Completed
	2.2	Fill erosion gullies at VD1 (FY17 rehabilitation) to the landform design surface	For area of newer rehabilitation completed in FY17. Erosion fill etc to be determined following soil sampling results so ameliorants can be incorporated. Sampling conducted February 2019 and report is being finalised	December 2019

Area		Item	Notes	Estimated completion
2. VD1	2.3	Construct rock lined waterways at VD1 (FY17 rehab) with trapezoidal cross-sections that capture, contain and control concentrated water flows.	See 1.8	Completed
	2.4	Test topsoil depth and characteristics for areas that have no woodland cover.	Detailed soil assessment of topsoil and subsoils on CD1 and VD1 have been completed. Amelioration recommendations from the report are being compiled and scoped. Ongoing soil assessments are planned for FY20 and onwards.	Complete
	2.5	Weed treatment	See 1.6	Ongoing
			General weed treatment commenced with detailed work described below. This work includes targeted spraying and cutting and panting of woody species.	Ongoing
			Improvements to weed management and assessments being assessed, such as the use of UAV high resolution aerial imagery.	Assessment work delayed due to availability of consultant, expected to be completed by the end of April. Progress to be reported in FY19 Annual Environmental Review.
			Exotic perennial grasslands identified in Future Harvest report will either be treated following outcome of trials detailed below.	See below
		Trial Area 1 identified in the Future Harvest Report	1. Slashing Winter 2019 2. Rip Contours 3. Spray emergent weeds early Spring 4. Re-seed 5. Spot treatment for weeds	Commencing July 2019

Area		Item	Notes	Estimated completion
2. VD1		Trial Area 2 identified in the Future Harvest Report	1. Secure area and conduct burn in early Spring 2019 2. Rip Contours 3. Spray emergent weeds early Spring 4. Re-seed 5. Spot treatment for weeds (Autumn 2020) 6. Tubestock planting	Commencing September 2019
	2.6	Contour drain removal	Design requirements assessment for this has commenced and will be completed in 2020	Scoping completed by 2020
	2.7	Habitat and water availability	Issue 2 identified in Future Harvest report. The final design will also include all weather access and removal of contour drains.	Determined by 2.6
	2.8	All weather road access	Issue 1 identified in Future Harvest report. The final design will also include water availability and removal of contour drains.	Determined by 2.6
	2.9	Stem density reduction	Issue 4 identified in Future Harvest Report. To be commenced in conjunction with weed control Trials 1 and 2	Completed by the end of FY20
	2.10	Water areas if winter rainfall is not sufficient	General irrigation of rehabilitation not considered practical. Targeted watering of tube stock planting will be investigated.	Dependent on tube stock planting.
	2.12	Ground cover diversity seeding	Undertake increased ground cover diversity seeding projects in native grassland areas.	Autumn 2020
	2.13	Translocate key species from pre-clearance areas	Commence translocation trials of key species from pre-clearance areas to cluster locations on VD1.	Autumn 2020
	2.14	Review weed treatment trials	Review of Trial Areas 1 and 2. Determine if slashing or controlled burn is more effective.	Autumn 2021
	2.15	Application of ameliorants	A significant amount of fertiliser and gypsum is to be applied to VD1 based on the soil assessment (see 2.4). This work is to be scope to determine the most efficient means of application.	Scoping to be completed by September 2020

Area		Item	Notes	Estimated completion
3. VD5 and MacLeans	3.1	Construct rock lined waterways at VD5 with trapezoidal cross-sections that capture water flows.	Rock lined drains as above.	commenced in February 2019 completed by the end of September 2019
	3.2	Review QA/QC procedures.	QA/QC procedures as above.	Complete
	3.3	New rehabilitation requires hay.	Erosion Stability Control (ESC) works as above (1.7, 2.1 and 2.5). Mulch sources being investigated (MWOO has been banned by EPA)	end of December 2019
		Soil Sampling	Soil sampling complete and draft report supplied for review. Other ESC works will revolve around the update of the MAC ESC Procedure.	Final version of report and recommendations to be complete by the end of March 2019.
3. VD5 and MacLeans	3.4	Re-rip, seed and fertilise FY17 rehab	Based on advice from other mine sites we believe best practice is to spray the weeds of the most recent rehabilitation prior to ripping and fertilising. This is to reduce the seed bank for weeds in the topsoil. See above regarding weed control works. Spraying works across all rehab to be delayed due to on boarding of new service providers. Review of the species present include saltbush. While this is not a target species, it's presence can help to ameliorate salts present in soils	Spraying works to be re-assessed. Ripping Scheduled for FY20.
4. CD1	4.1	Application of ameliorants	A significant amount of fertiliser and gypsum is to be applied to CD1 based on the soil assessment (see 2.4). This work is to be scope to determine the most efficient means of application.	Scoping to be completed by September 2020
	4.2	Stem density reduction	To be completed following 2.9. Focus is currently on VD1 improvements.	Estimated to commence in Autumn 2021
	4.3	Habitat and water availability	To be completed following 4.3. Focus is currently on VD1 improvements.	Estimated to commence in Autumn 2021
	4.4	Understory planting	To be completed following 4.3. Focus is currently on VD1 improvements.	Estimated to commence in Autumn 2021

Area		Item	Notes	Estimated completion
4. CD1	4.5	Weed treatment	See 1.6. Focus is currently on VD1 works.	Ongoing
5. Macdonalds and Belmont area	5.1	Rip, seed and fertilise FY17 rehab	This work is to be re-assessed based on the longer term plan as some of the areas will be required for further dumping.	
5. Macdonalds and Belmont area	5.2	Fill erosion gullies at MacDonald's to the landform design surface.		
	5.3	Remove contour drains		
	5.4	Fill erosion gullies at MacDonald's Void (2000 rehabilitation) to the landform design surface.		
	5.5	Use successful examples from around site to identify what rehabilitation treatments and methods work best at MAC and develop standard practice.	As per 1.5.	To be commenced in FY20
	5.6	Translocate key species from pre-clearance areas	Vegetation here should be suitable for species to be relocated.	To be commenced in FY20

2.3 Subsidence Remediation for Underground Operations

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 AFP period.

2.4 Temporary Stabilisation

Temporary stabilisation activities proposed for this AFP period 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. Approximately 600 ha of aerial seeding is proposed during this AFP period for temporary stabilisation.

Alternative temporary stabilisation option is being investigated for new rehab (refer to Table 2).

3 Plan 2 – Mining and Rehabilitation 3 Yearly Forecast

The following figures show the progression of mining and rehabilitation for Mt Arthur Coal for the period FY20, 21 and 22.

ML1757
AUTH171
ML1655
ML1487
ML1548
MPL263
CCL744
CL396
ML1739
ML1739
CL395
ML1739
AUTH437
ML1548
CL229
EL5965
ML1739
ML1593S
ML1593
ML1358
AUTH437

LEGEND

- Approved Ancillary Disturbance
- Mining Lease
- FY20 Changes

FY20 Forecast

- Tailings Storage Facility
- Rehabilitation
- Active Mining Area (Open cut void)
- Topsoil Stockpile
- Infrastructure Area
- Other
- Overburden Emplacement Area
- Water Management Area

BHP
Mapping Services Brisbane

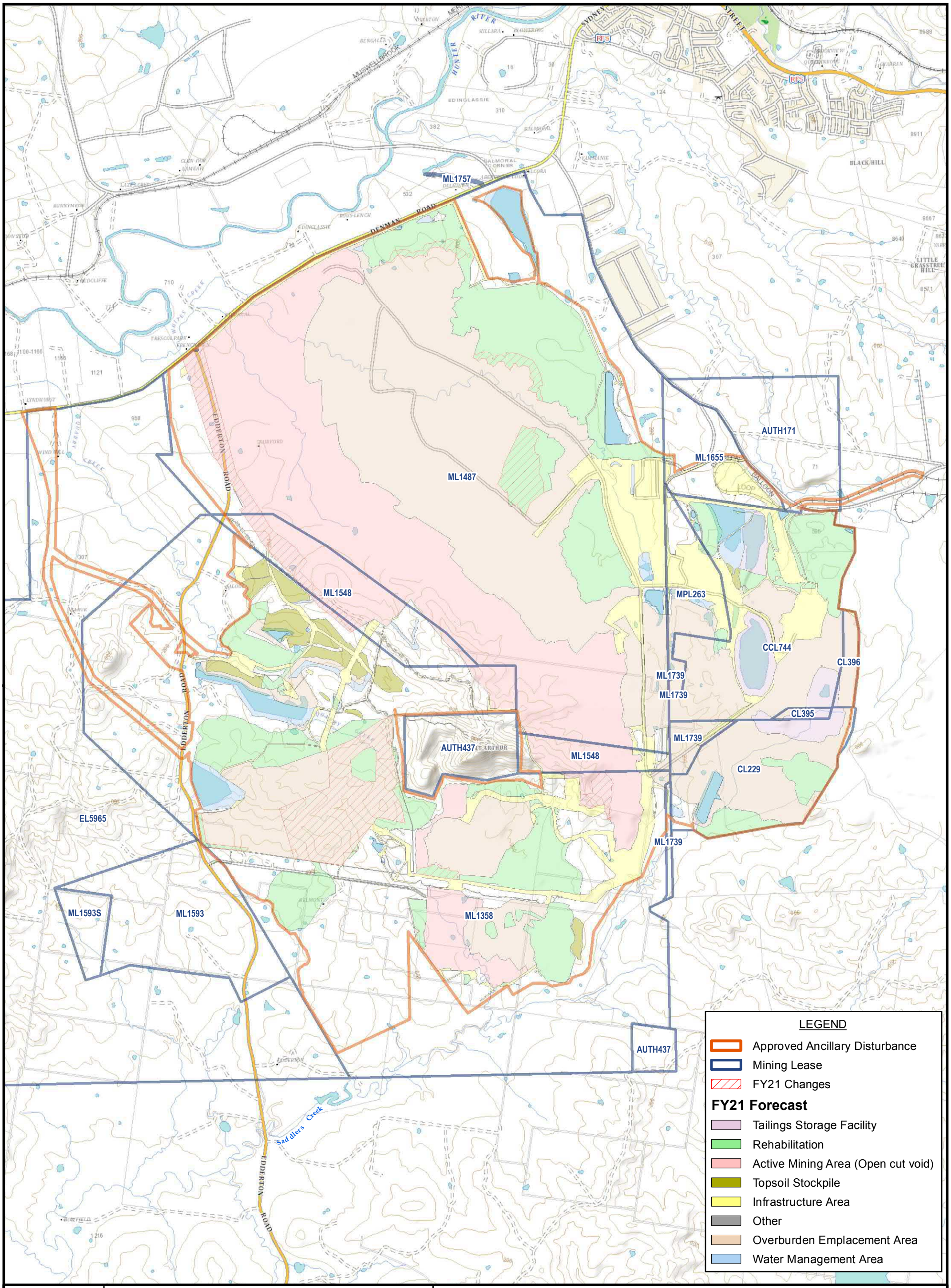
0 500 1,000 1,500 2,000 m

Transverse Mercator Projection.
MGA Zone 56. GDA94 Datum.

MOUNT ARTHUR COAL

FY2020 DISTURBANCE FORECAST

Drawn: B. Kleinschmidt	Checked: K. Brake	Date: 15/7/2019	Revision: 0	Filename: MAC_FowardProgram2A	Plan 2A



BHP

Mapping Services Brisbane

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

Transverse Mercator Projection.
MGA Zone 56. GDA94 Datum.

MOUNT ARTHUR COAL

FY2021 DISTURBANCE FORECAST

Drawn: B. Kleinschmidt	Checked: K. Brake	Date: 15/7/2019	Revision: 0	Filename: MAC_FowardProgram2B	Plan 2B

ML1757
AUTH171
ML1655
ML1487
ML1548
MPL263
CCL744
CL396
ML1739
ML1739
CL395
ML1739
AUTH437
ML1548
CL229
EL5965
ML1739
ML1593S
ML1593
ML1358
AUTH437
DENMAN ROAD
EDDERTON ROAD
HUNTER RIVER
MUSWELLBROOK
BLACK HILL
LITTLE GRASSTREE HILL
Sad dlers Creek

LEGEND

- Approved Ancillary Disturbance
- Mining Lease
- FY22 Changes

FY22 Forecast

- Tailings Storage Facility
- Rehabilitation
- Active Mining Area (Open cut void)
- Topsoil Stockpile
- Infrastructure Area
- Other
- Overburden Emplacement Area
- Water Management Area

BHP
Mapping Services Brisbane

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

Transverse Mercator Projection.
MGA Zone 56. GDA94 Datum.

MOUNT ARTHUR COAL

FY2022 DISTURBANCE FORECAST

Drawn: B. Kleinschmidt	Checked: K. Brake	Date: 15/7/2019	Revision: 0	Filename: MAC_FowardProgram2C	Plan 2C

4 Progressive Mining and Rehabilitation Statistics

4.1 Three Yearly Forecast Cumulative Disturbance and Rehabilitation Progression

During this AFP period, Mt Arthur Coal will continue to implement the rehabilitation programs contained in the site Rehabilitation Strategy. This will include the reshaping and seeding of 283 ha. Disturbance and rehabilitation progression during the three year term is presented in Table 3.

Table 3: Predicted cumulative disturbance and rehabilitation progression during AFP term

Year	Total Disturbance Area (Annual)	Underground mining area	Total Active Disturbance (Annual)	Rehabilitation Land Preparation (Annual)	Ecosystem & Land Use Establishment (Annual)
End FY 20 (30 Jun 2020)	687	0	606	53	81
End FY21 (30 Jun 2021)	353	0	272	81	81
End AFP (30 Jun 2022)	240	0	119	121	121

4.2 Rehabilitation Key Performance Indicators

The rehabilitation to disturbance ration is presented in Table 4. As described in the RMP, MAC dig and dump has been constrained at the northern end. As a result this has slowed the advancement of the northern emplacement and pushed mining intensity to the southern areas of the main pit. Over the past 2 years, MAC has been through a comprehensive opportunity assessment to determine the most effective plan for rehabilitation and mining to deal with this constraint. The most recent inclusion is the main pit realignment to reduce the obtuse angle between the endwall (north) and advancing highwall to transition back to 90 degrees. By doing this, the northern emplacement adjacent to Denman Road will be accelerated and rehabilitation will be released more consistently across the years.

The eastern and southern areas of the main emplacement are not available for rehabilitation consistently in the near term due to the size and height of the final dump and the time to take to reach its outer limits. The tailings dam is also a hard constraint on the eastern perimeter of the mine. Additionally, the two south west out of pit emplacements are being placed in a way that will maximise rehabilitation and minimise the amount of time an open face would be visible from off the mine site (south west direction).

Table 4: Progressive rehabilitation key performance indicators during the AFP term

Year	Total New Active Disturbance Area (annual)	Area of Land Proposed for Active Rehabilitation (annual)	Annual Rehabilitation to Disturbance Ratio
End FY 20 (30 Jun 2020)	469	80	0.14
End FY21 (30 Jun 2021)	272	82	0.30
End AFP (30 Jun 2022)	119	121	1.02

Appendix 1: Document Control Authorisation

Business Process Owner Endorser Authorisation			
Position	**Name**	**Date**	**Signature**
Superintendent HSE Business Partnership	Kris Sheehan	10/7/19	
Manager Production Planning	Damien Perkins	04-07-2019	
Superintendent Tactical Planning	Rob Pascoe	10/07/19	

Approver Authorisation			
Position	**Name**	**Date**	**Signature**
General Manager	Dawid Boshoff	4/7/19	

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

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	Site 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.

MAC-ENC-MTP-000

BHP

Mt Arthur Coal: Rehabilitation Management Plan

1 General

The Rehabilitation Management Plan (RMP) satisfies the requirement for condition 44 of the Project Approval as required by the Department of Planning and Environment (DPE).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.

2 Mt Arthur Coal Lease Block

Mt Arthur Coal Lease Block	
Name of Mine	Mt Arthur Coal
Rehabilitation management Plan Commencement Date	1 July 2019
Rehabilitation management Plan 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, CL 229, CL 335, ML1757, ML1739
Name of Authorisation / lease Holder	Hunter Valley Energy Coal Pty Ltd
Name of Mine Operator:	Hunter Valley Energy Coal Pty Ltd
Name and Contact Details of the Manager (or equivalent):	David Boshoff, General Manager Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Ph: 02 65445566 Email: David.Boshoff@BHP.com
Name and Contact Details of Environmental Representative:	Kris Sheehan, Superintendent HSE, Mt Arthur Coal Thomas Mitchell Drive Muswellbrook NSW 2333 Email: Kris.Sheehan@BHP.com
Name and Title of Representative(s) of the Lease Holder(s):	
Title:	David Boshoff
Signature:	
Date:	4/7/19
Version – 1.0	Rehabilitation Management Plan

MAC-ENC-MTP-000

Mt Arthur Coal: Rehabilitation Management Plan

Key contact

Document Developer – Environment Analysis and Improvement (east)
Document Owner – Superintendent HSE Business Partnership
Document Approver – General Manager
Document Authorisation is located in Appendix 1.

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Application

This Plan applies to the following:

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

Abbreviations

AEMR	Annual Environmental Management Report
AHMP	Aboriginal Heritage Management Plan
BCM	Bank cubic metres
BMP	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
DP&E	NSW Department of Planning and Environment
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
MACT	Mt Arthur Coal Terminal
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	NSW Office of Water
NSW	New South Wales
OEH	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

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 MAC, 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.
- **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.

3 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.

WYBONG ROAD
MUSWELLBROOK
NORTHERN
COAL
ROXBURGH
DENMAN ROAD
EDDERTON ROAD
JERRYS PLAINS ROAD
BLACK HILL
DILLIESTON
RANDWICK PARK HILL
PLASHETT KNOB
PLASHETT RESERVOIR
HUNTER
WHITES CREEK
QUARRY CREEK
RIAMROD CREEK

ML1757
ML1487
ML1548
ML1593S
ML1593
ML1358
AUTH171
ML1655
MPL263
CCL744
ML1739
CL396
CL395
CL229
AUTH437
EL5965

6430000
6425000
6420000
6415000
6410000
290000
295000
300000

LEGEND
Approved Ancillary Disturbance
Mining Lease
Natural Woodland

BHP
Mapping Services Brisbane

0 1,000 2,000 3,000 m

Transverse Mercator Projection.
MGA Zone 56. GDA84 Datum.

MOUNT ARTHUR COAL

Pre-Mining Environment - Project Locality

Drawn: B. Kleinschmidt	Checked: L. Neil	Date: 5/06/2019	Revision: 0	Filename: MAC_RehabPlan_1A	PLAN 1A

3.1 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 (DP&E) 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.

3.2 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 2019 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 Drayton 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.

3.2.1 Mining Tenements

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

3.2.2 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.

3.2.3 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 2019

Description	Issue date	Expiry date
Development consents or project approvals issued by the DP&E		
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 DRG		
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 17/10/2018)	Not specified
EPBC approval issued by the DoE		
EPBC 2011/5866	30/04/2012	30/06/2022
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.

bhpbilliton

Mapping Services, Brisbane

Scale 1:50,000 @ A3

0 1 2

Kilometres

Projection: GDA94 MGA Zone 56

MT ARTHUR MINE

Statutory Approvals and Key Infrastructure

Drawn: B Kleinschmidt	Date: 27/07/2018	Revision: 0	Figure: 2
Checked: L. Neil	Filename: 20170201-2 Stat Approvals.mxd		

HUNTER RIVER

DENMAN ROAD

EDDERTON ROAD

THOMAS MITCHELL DRIVE

NEW ENGLAND HIGHWAY

300000

6420000

6420000

280000

300000

ML1757

MT ARTHUR COAL MINE

Northern Open Cut

ML1487

CHPP

ML1655

AUTH171

ML1548

MPL263

CCL744

CL396

ML1739

Tailings Emplacement Area

SUBLEASE CL395

Drayton Coal Mine

Belmont Void

AUTH437

Mount Arthur

ML1548

ML1739

SUBLEASE CL229

McDonalds Void

ML1358

EL5965

Southern Open Cut

ML1739

ML1593

AUTH 437

Saddlers Creek

LEGEND

- Mt Arthur Mining Leases
- Mt Arthur Exploration Licence
- Environmental Protection Licence (EPL 11457)
- Approved Ancillary Disturbance Boundary
- Environmental Assessment Boundary
- Crown Land
- Underground Maximum Potential Subsidence Area

3.3 Land Ownership and Land Use

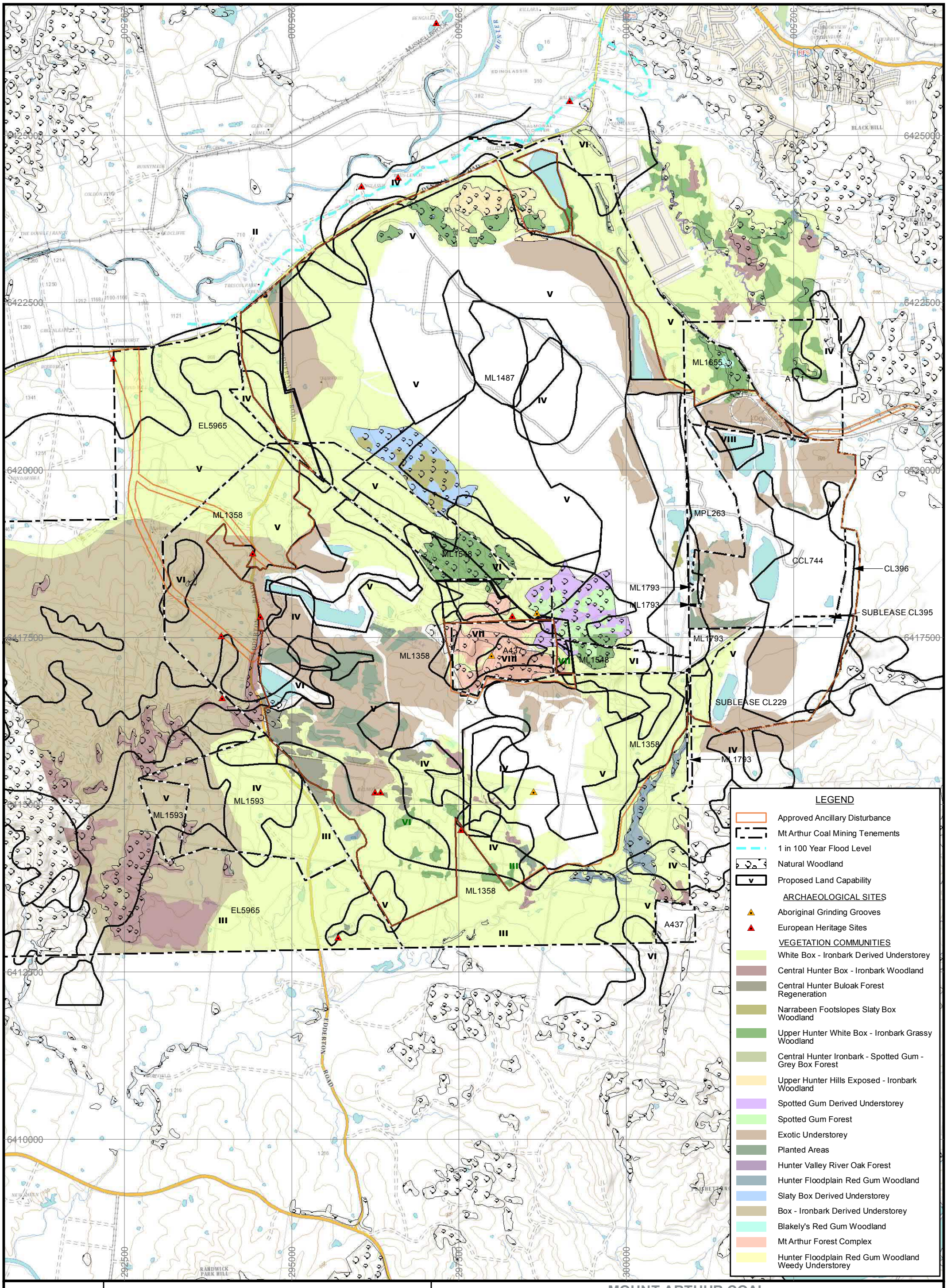
With the exception of small areas of Crown land, road reserves and private freehold property, Mt Arthur Coal and its subsidiaries own all the land within the Mt Arthur Coal mining tenements. Mt Arthur Coal also owns adjacent properties to the north-east, north and west, which are maintained as buffer land or biodiversity offset areas. With the exception of the Drayton 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.

Anglo Coal (Drayton Management) Pty Ltd (Anglo) owns the majority of land to the immediate east and south of Mt Arthur Coal mining tenements, including the 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

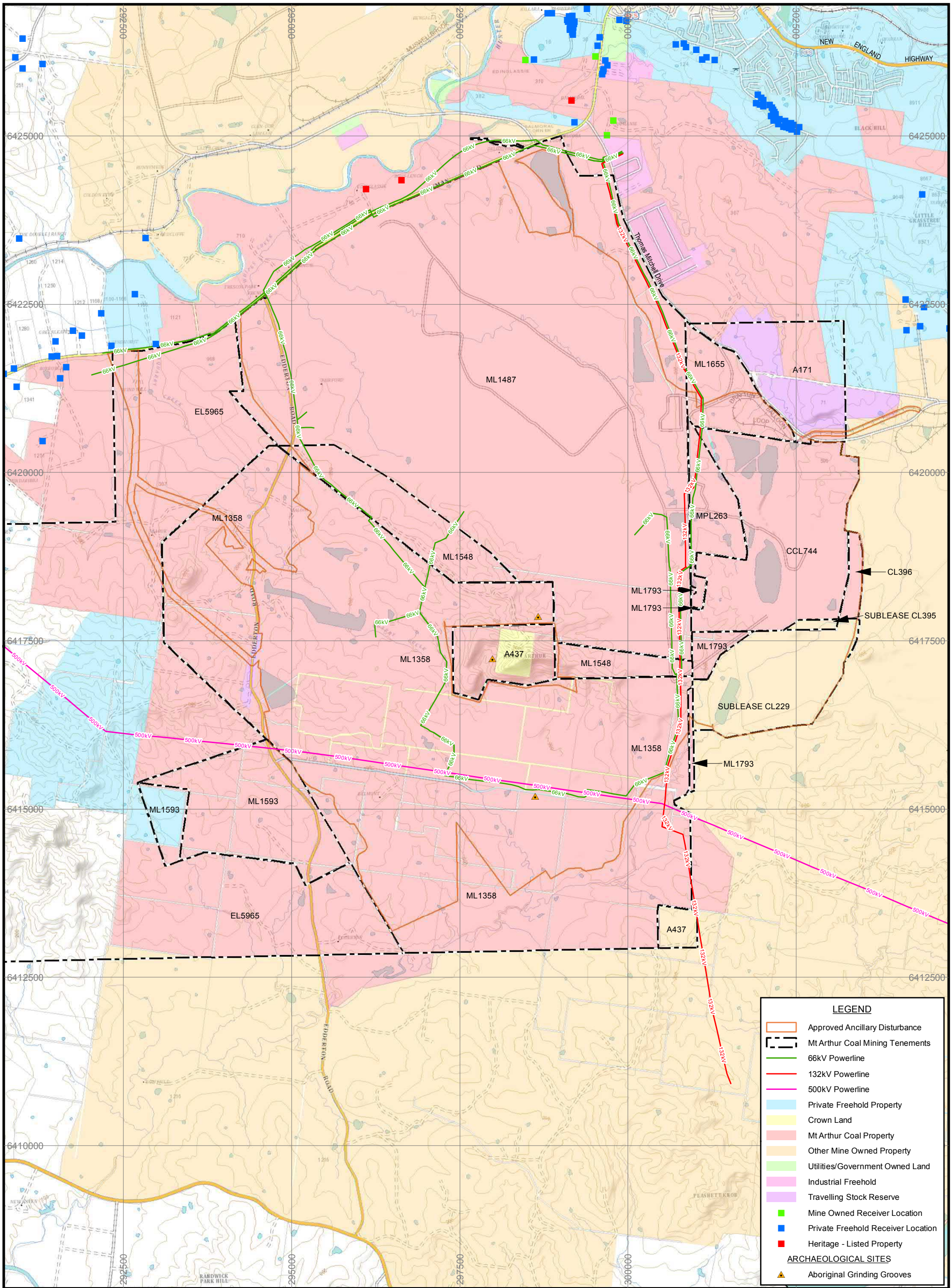
0 500 1,000 1,500 2,000 m

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	PLAN 1B



BHP
Mapping Services Brisbane

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Transverse Mercator Projection.
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	PLAN 1C

4 Final Land Use

4.1 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)[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

Section/Condition	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.
Project Approval (09_0062 MOD 1) 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.
Project Approval (09_0062 MOD 1) 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.
Project Approval (09_0062 MOD 1) Schedule 3, Condition 41A	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.	Rehabilitation objectives are outlined in Section 5 of this RMP. The current approved Rehabilitation Strategy was revised and submitted to DP&E for approval in April 2017.
Project Approval (09_0062 MOD 1) 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: 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	Extension to December 2015 by agreement in accordance with (a) to allow for consultation with Council. The current approved Rehabilitation Strategy was revised and submitted to DP&E for approval in June 2018.

Section/Condition	Requirement	Summary of Status
	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.	
Project Approval (09_0062 MOD 1) 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 8 of this RMP. Completion of the rehabilitation and temporary stabilisation activities proposed are understood to demonstrate compliance with Condition 43(b).
Project Approval (09_0062 MOD 1) 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: 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.	DRE 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 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 500 ha of Box Gum Woodland, and 1415 ha Rehabilitation Corridors).	Progressive regeneration of woodland and forest communities at Mt Arthur Coal commenced in the mid-1990s. More than 400Ha of seeding and tubestock planting aimed at establishing Box Gum

Section/Condition	Requirement	Summary of Status
		Woodland. Further planting is aimed at the northern mine emplacement area.
Mining Tenement ML1358	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. 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.	No directives consistent with Conditions 6 or 19 are currently in force. Any such future directives will be incorporated into future RMP versions. Planned activities to meet conditions 16 (a), 16(b), 27, 30 and 33 are incorporated into Section 8 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 7 of this RMP.
Mining Tenement ML1358 continued	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.	Topsoil stockpile locations are shown in the Annual Forward Program (previously a MOP).

Section/Condition	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. 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 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	No directives consistent with Condition 15 are currently in force. Any such future directives will be incorporated into future MOP versions. Planned activities to meet conditions 21, 23 are incorporated into Section 8 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 7 of this RMP.

Section/Condition	Requirement	Summary of Status
	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	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. 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.	Activities to meet condition 13(a) are incorporated into Section 8 of this RMP. Activities to meet condition 13(b) are incorporated into Land Management procedure, and summarised in Section 8 of this RMP. 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 8 of this RMP.
Mining Tenement CCL 744	7 Disturbed land must be rehabilitated to a sustainable/agreed end use to the satisfaction of the Director-General. 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.	Activities to meet condition 7 are incorporated into Section 8 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 8 of this RMP.

4.2 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 730ha and 281m below ground level
    - Belmont void, 40ha and 28m below ground level
    - McDonald void, 32ha and 57m below ground level

4.3 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 Environmental Assessment documentation. HVEC continues to study opportunities for land use and final void use and will continue to discuss these with the community and Government.

4.4 Stakeholder Consultation

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

- Department of Planning and Environment (DP&E);
- Office of Environment and Heritage (OEH);
- NSW Department of Primary Industries – Water (DPIW);
- Muswellbrook Shire Council (MSC);
- Mt Arthur Coal Community Consultative Committee (CCC); and
- Neighbouring mining operations.
- Neighbouring community

4.4.1 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: http://www.bhpbilliton.com/home/aboutus/regulatory/Pages/default.aspx;
- 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;

- 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; and

4.4.2 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) (see section 8.2 for further details). 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 of the Geomorphological design will continue to meet stability, land use, safety and cost requirements.

4.5 Final land Use and Mining Domains

Final Land Use Domains

Primary domains are final land use domains post-mining land management units characterised by similar land use.

Secondary 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 Plan 2, are outlined in Table 3

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

Table 3: Mt Arthur Coal Primary and Secondary Domains

Secondary Domain	Code	Primary 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		

4.6 Asset Register

. A register of major assets (including buildings, fixed plant and other infrastructure), categorised by primary 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
Primary 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;	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; and 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; 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 conveyors removed and then collapsed. 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. All concrete footings, pads/slabs and vehicle parking areas would be demolished and removed to at least 1.5 m below the ground. Tank farms and fill points will be decontaminated prior to demolition and disposal. Where hydrocarbon contamination is identified above regulatory limits, 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.
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.

Domain	Assets	Decommissioning/ rehabilitation requirements
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.

5 Rehabilitation Objectives and Completion Criteria

5.1 Rehabilitation objectives and completion 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.

The overall rehabilitation objectives for Mt Arthur Coal are discussed in Section 5 of this RMP. These site rehabilitation objectives have been further developed into the specific objectives for the primary and secondary domains identified in Section 4, and are presented in Table 5.

Table 5 shows the link between the rehabilitation objectives from Table 14 of the Mt Arthur Coal Mine – Open Cut Modification Project (PA 09_0062 MOD 1) and the detailed objectives and criteria developed to compliment the Project approval objectives.

Table 5. Domain Specific Rehabilitation Objectives and Criteria

Approval Feature	Approval Objective	Closure Domain (Primary)	Detailed Objective	Completion Criteria	Performance / Leading Indicator
Mine site (as a whole)	Safe, stable and non-polluting final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding natural landforms	All Domains Water management area; Final Void Rehabilitated Areas – Pasture; Rehabilitated Areas – Native Woodland; Rehabilitated Areas – Box Gum Woodland; Offset Areas; and Non-operational lands	Safe, stable and non-polluting final landforms designed to incorporate natural micro-relief and natural drainage lines to integrate with surrounding natural landforms	Closure criteria and proposed final land use developed through stakeholder consultation Landforms are independently assessed as safe and stable compatible with surrounding natural landscape Restoration of mined land achieves visual amenity Ecologically sustainable land management practices aligned with approved domain TSF capped to ensure long-term containment of emplaced material and sustains proposed land use Removal, treatment and/or containment of hazardous or contaminated material The rehabilitated post-mining landscape will not cause environmental impacts greater than surrounding non-mined land	Independent Geotechnical inspections landforms completed Emplacement areas progressively rehabilitated Comparison to analogue sites Stakeholder consultation documentation Reporting progress in the AEMR “Annual Rapid Assessment” of indicators including: • Vegetation ground cover • Landform stability and erosion control • Drainage Independently reviewed plan and design for TSF capping
Agricultural land	Rehabilitate at least 33 hectares of Class II agricultural capability land in the area identified in the rehabilitation plan (see Appendix 7) Rehabilitate other areas identified for agricultural use in the rehabilitation plan to sufficient agricultural capability to support grazing	Rehabilitated Areas - Pasture	Rehabilitated pasture landscapes support environmentally sustainable livestock grazing Post-mining landuses will be consistent with surrounding landuses, and not impact on biodiversity values of adjacent woodland and conservation areas.	Land is compatible with proposed land use Return appropriate areas of land to sustainable grazing use Post mining land use does not negatively impact on the biodiversity or environmental values Encourage sustainability and diversity of land use through stakeholder consultation	Pasture species mix identified for preferred land capability Pasture productivity assessment Soil assessment Grazing trial assessment Post-mining land ownership is consistent with post-mining land use including basic farm infrastructure. Land use is aligned to current and foreseable future usage of adjoining and regional land Participate in local and regional forums to assess land use options
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.	Rehabilitated Areas – Native Woodland; Rehabilitated Areas – Box Gum Woodland; - Onsite Conservation and Offset areas	Rehabilitation will establish at least 2142ha of native woodland vegetation community (excluding 500 ha Box Gum Woodland). The rehabilitated post-mining landscape will be compliant with relevant regulatory and corporate requirements. Rehabilitation areas will include at least 500 ha of re-established Box Gum Woodland. All onsite biodiversity offset and conservation areas will be managed to increase their biodiversity and habitat value, and meet regulatory requirements.	Suitable vegetation for re-establishment aligned to proposed plant communities Revegetation has facilitated fauna colonisation and landscape function Plant communities are creating effective habitat linkages and are aligned to surrounding native vegetated lands Biodiversity Offset Management Plan, as conditioned in the Project Approval, is implemented	Native vegetation selection incorporates local species and sourcing seed of local provenance (where possible) Management plan in place for threatening issues such as overgrazing, fire, weeds, drought and pests Evidence to demonstrate that the ecosystem will progress towards self-sustaining recruitment Annual rapid assessment, monitoring and reporting Minimum rehabilitation of 2142ha of native woodland vegetation community Minimum rehabilitation of 500 ha of re-established Box Gum Woodland

Approval Feature	Approval Objective	Closure Domain (Primary)	Detailed Objective	Completion Criteria	Performance / Leading Indicator
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.	Final Voids	Mining voids remaining in the rehabilitated post-mining landscape will be safe, stable and non-polluting	Final voids assessed by a qualified geotechnical engineer for stability and do not pose a safety risk Void use is compatible with long-term void relinquishment options No long term groundwater impact to downstream users Final voids are consistent with achievable key stakeholder agreed social and environmental values	Void opportunity assessment and recommendations developed in consultation with stakeholders Independent assessment of void design and stability Hydrological modelling Measurement of water quality Defined final use
Creek 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	Water management.	Rehabilitated water management features will be re-instated and managed as stable, rates of erosion commensurate with that of analogue landforms and non-polluting landform features that either hold water (i.e. dams) or allow the unimpeded flow of water (i.e. drainage lines and watercourses) as designed.	Decommissioned mine water management facilities rehabilitated to stable and rates of erosion commensurate with that of analogue landforms and/ or watercourses. Rehabilitated water management features will be re-instated and managed as stable, and non-polluting landform features that either hold water (i.e. dams) or allow the unimpeded flow of water (i.e. drainage lines and watercourses) as designed	Independent hydrological assessment showing the diversions will function as designed Evidence to demonstrate that the ecosystem will progress towards self-sustaining
Surface infrastructure	To be decommissioned and removed, unless DRE agrees otherwise	All Domains	To be decommissioned and removed, unless agrees otherwise DRE	Unless required for post-mining use, infrastructure areas decommissioned and demolished, resulting in safe, stable and non-polluting landscape	Hazardous materials assessment of infrastructure completed to identify the potential health and environmental risks associated with demolition Infrastructure removed and demolished Independent contaminated site assessment after infrastructure removal No visual contamination
Community	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure.	Final voids, Rehabilitated Areas Pasture; Rehabilitated Areas Native Woodland; Rehabilitated Areas Box Gum Woodland; Offset Areas	Ensure public safety Minimise the adverse socio-economic effects associated with mine closure. Land use provides social and economic value to the local and wider community	Sustainability and diversity demonstrated by vegetation type, land use type and suitability to final landform Ongoing management requirements no greater than adjacent non-mined land Post-mining land use is compatible with surrounding land use in terms of social and economic benefit (local and wider community)	Construction of emplacements as per design Progressive rehabilitation Assessment of land use opportunities in conjunction with stakeholders Evidence to demonstrate that the ecosystem will progress towards self-sustaining recruitment (woodlands) Pasture areas are independently shown to support stock

5.2 Stakeholder Consultation

5.2.1 General Consultation

Mt Arthur Coal regularly engages with local stakeholders regarding proposed operations, potential impacts and management, and 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:
- http://www.bhpbilliton.com/home/aboutus/regulatory/Pages/default.aspx;
- 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;
- 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; and

5.2.2 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 establishment of the Future Landscapes Design Project (FLDP) (see section 8.2 for further details). 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 MOP 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 of the Geomorphological design will occur during 2018 to identify where further application of the design will meet stability, land use, safety and cost requirements.

Consultation with The Department of Planning and Environment, the Community and Muswellbrook shire Council occurs with each revision of the RMP.

6 Final Landform and Rehabilitation Plan

6.1 Final Landform and Rehabilitation Plan

The final landform and rehabilitation plan is shown in Figure 5. 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.

Denman Road

Thomas Mitchell Drive

Northern Void

McDonalds Void

Belmont Void

Edderton Road

HUNTER RIVER

Whites Creek

Quarry Creek

Ramrod Creek

Saddlers 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

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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	Plan 4

6.2 Final Landform and Rehabilitation Plan Submission

6.2.1. 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 attached to the RMP when submitted for approval to the NSW Resources Regulator.

6.2.2. 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.

6.3 Final Landform and Rehabilitation Plan – cross sections

Unless otherwise directed by the Department, sections at right angles to the direction of mining, at intervals of 1000 metres are considered appropriate for open cut coal mines. Cross section locations are shown in Figure 6. Cross sections are shown in Figure 7, Figure 8, Figure 9, Figure 10 and Figure 11.

BHP

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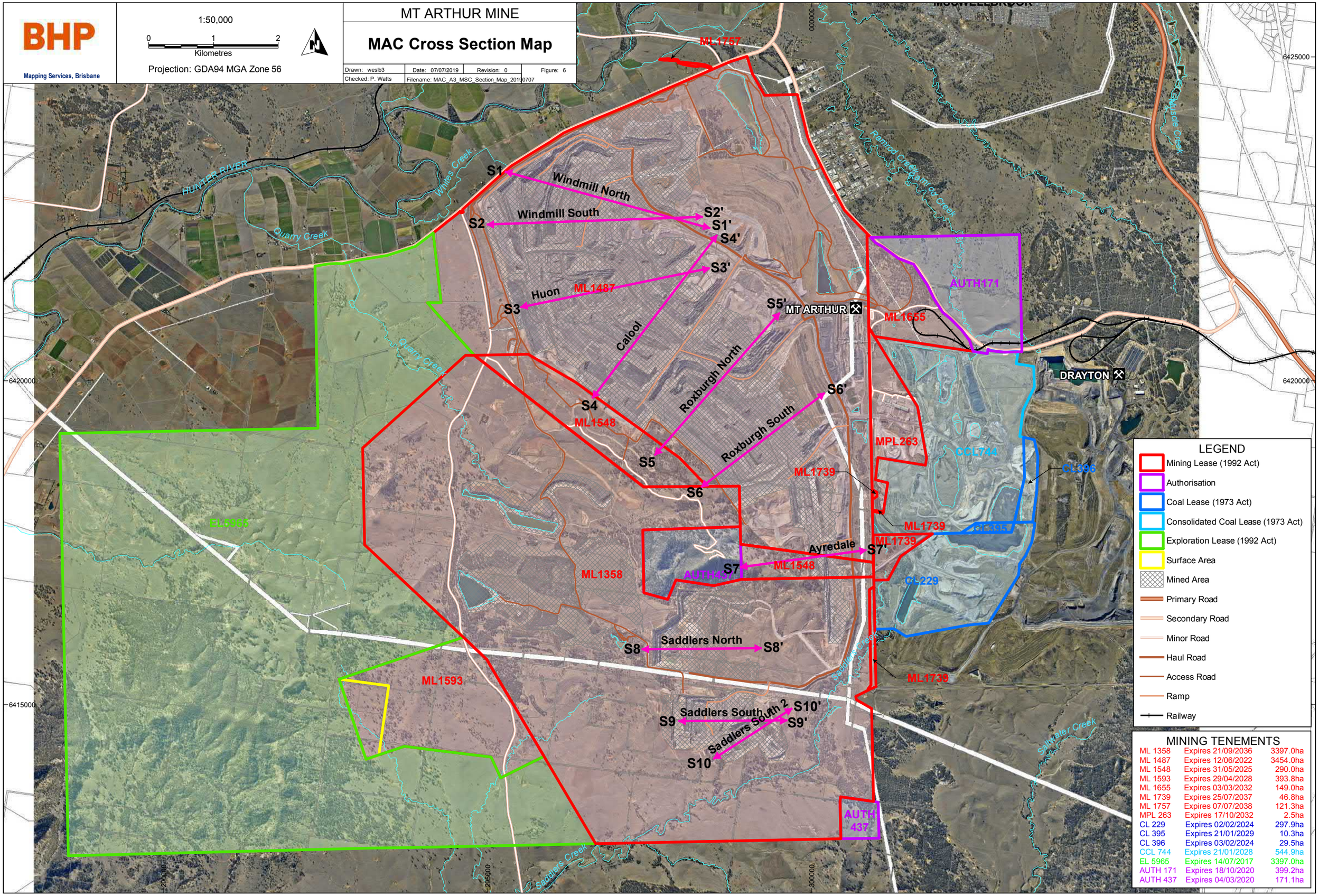
Projection: GDA94 MGA Zone 56

MT ARTHUR MINE

MAC Cross Section Map

Drawn: weslb3	Date: 07/07/2019	Revision: 0	Figure: 6
Checked: P. Watts	Filename: MAC_A3_MSC_Section_Map_20190707		



MINING TENEMENTS

ML 1358	Expires 21/09/2036	3397.0ha
ML 1487	Expires 12/06/2022	3454.0ha
ML 1548	Expires 31/05/2025	290.0ha
ML 1593	Expires 29/04/2028	393.8ha
ML 1655	Expires 03/03/2032	149.0ha
ML 1739	Expires 25/07/2037	46.8ha
ML 1757	Expires 07/07/2038	121.3ha
MPL 263	Expires 17/10/2032	2.5ha
CL 229	Expires 02/02/2024	297.9ha
CL 395	Expires 21/01/2029	10.3ha
CL 396	Expires 03/02/2024	29.5ha
CCL 744	Expires 21/01/2028	544.9ha
EL 5965	Expires 14/07/2017	3397.0ha
AUTH 171	Expires 18/10/2020	399.2ha
AUTH 437	Expires 04/03/2020	171.1ha

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MT ARTHUR MINE

MAC Cross Sections

Drawn: weslb3	Date: 07/07/2019	Revision: 0	Figure:
	Filename: MAC_A3_MSC_Sections_20190707		

Topographic Surface from 23-06-2019 Prime
Base of Weathering Grid from Feb-2017
F-section Grids from model MAC_1017

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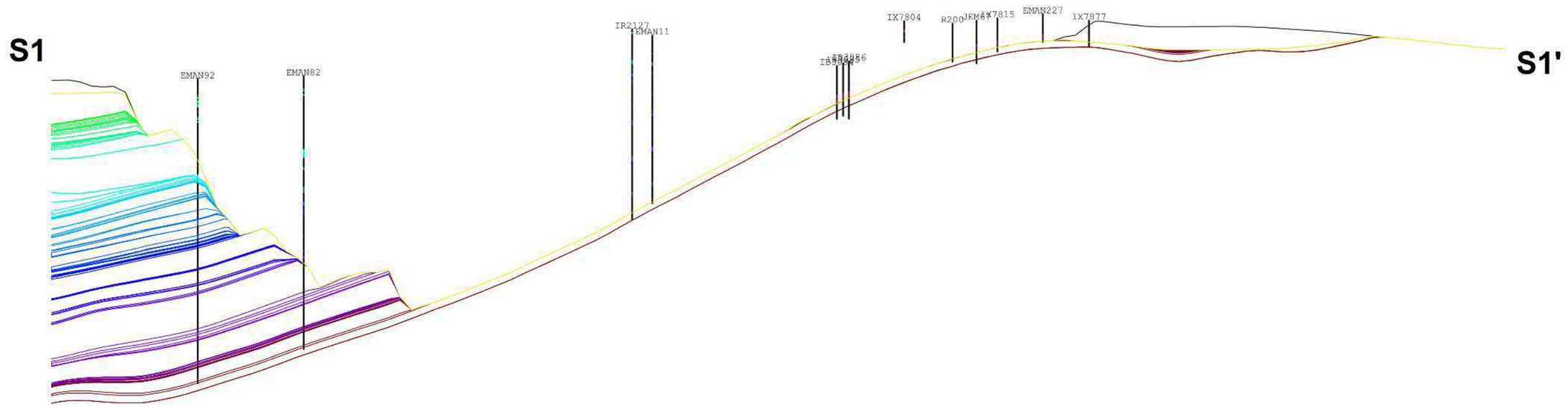
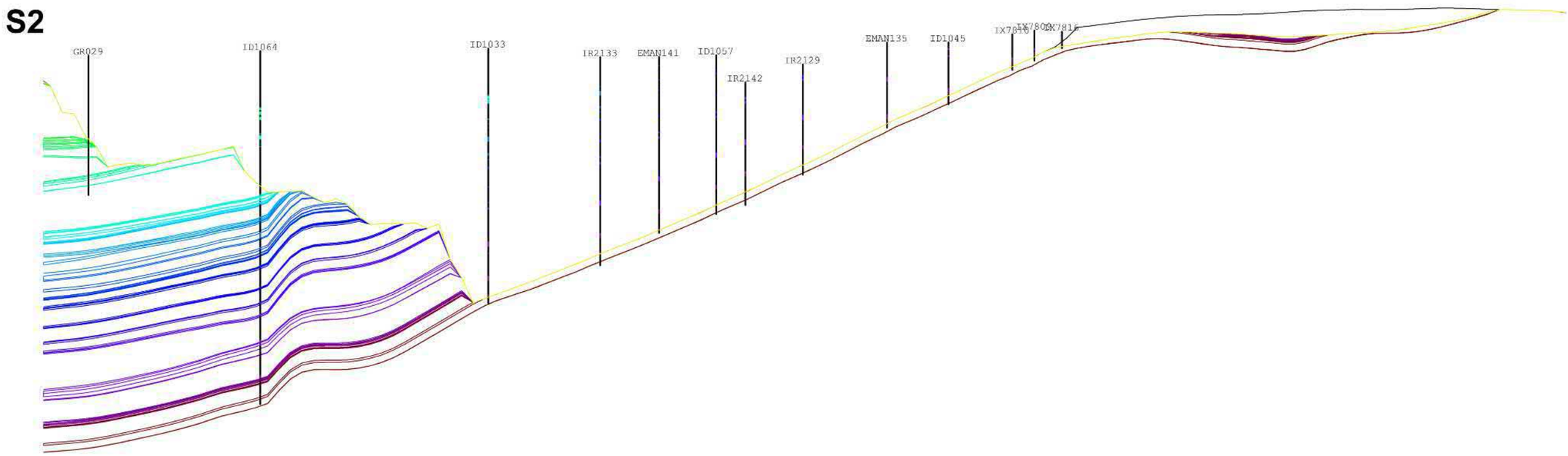


WINDMILL SOUTH PIT



WYBU WYBL RBU RBM RBL WBU WBL WHN FBK1 FBK2 FBK3 FUNA FGM1 FGM2 FGM3 FGM4 FWH1A FWH1B FWH1C FWH1 FWH2 FWH3 FWH4 FUNB UNBL

AF1A AF1B FAF FAF2 FBF1 FBF2 FBF3 FWW0 FWW1 FWW2 FWW3 FMUU FMUT FMU FMMT FMMB FMLT FMLB FML3 FUNC FPU1 FPU PUA PUB

FPL1 FPL FUNI FVU1 FVU FVM1 FVM VL1A VL1B VL2 FVL FBR1 FBR FBR3 FBU FBM FBL FBL2 FWU FWM FWL FWL2 FEU FET FEB FCT

FCB FBNU FBAU FBA FBB FBC FUNE FEG1 FEG23 FT FR1 FR2A FR2B FR3A FR3B FR3C FR4 FR56

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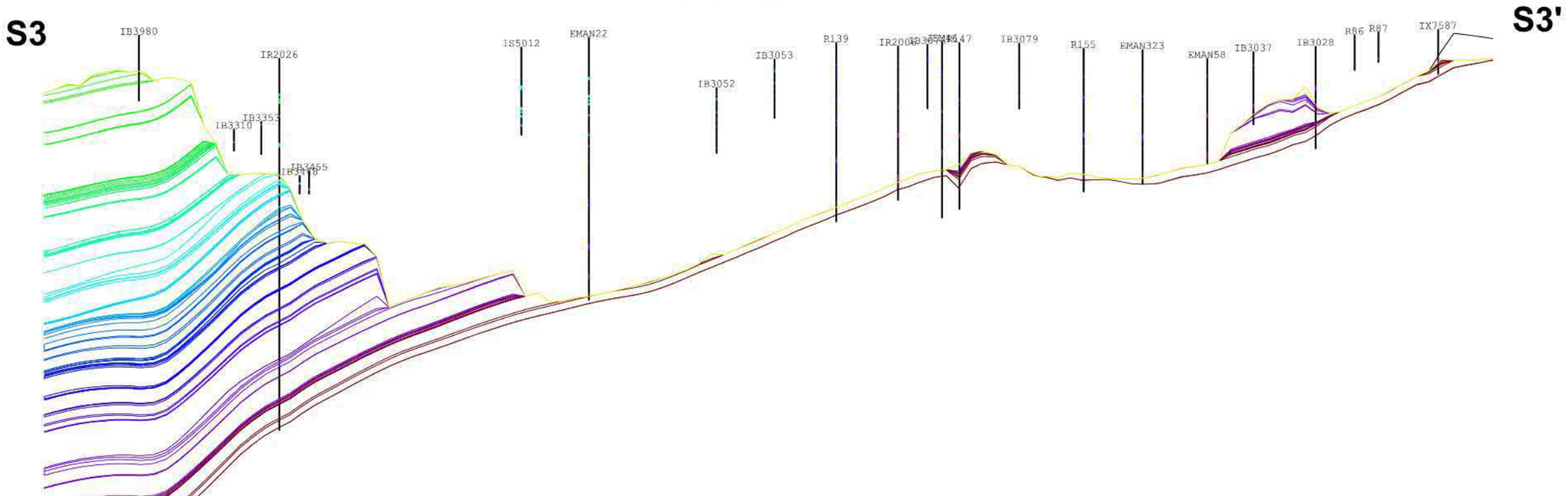
MT ARTHUR MINE

MAC Cross Sections

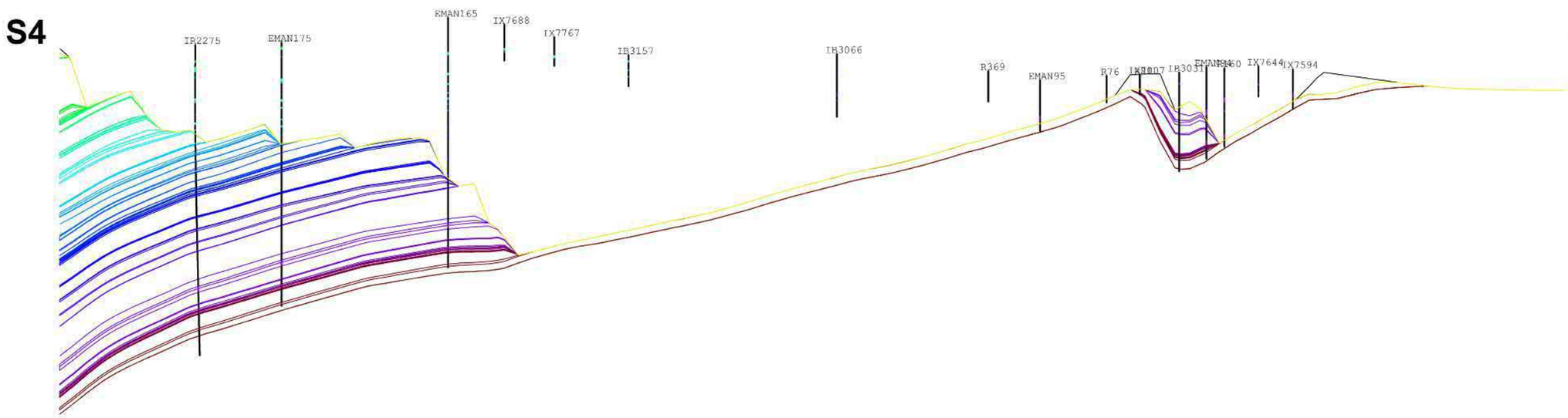
Drawn: weslb3	Date: 07/07/2019	Revision: 0	Figure:
	Filename: MAC_A3_MSC_Sections_20190707		

Topographic Surface from 23-06-2019 Prime
Base of Weathering Grid from Feb-2017
F-section Grids from model MAC_1017

HUON PIT



CALOOL PIT



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MT ARTHUR MINE

MAC Cross Sections

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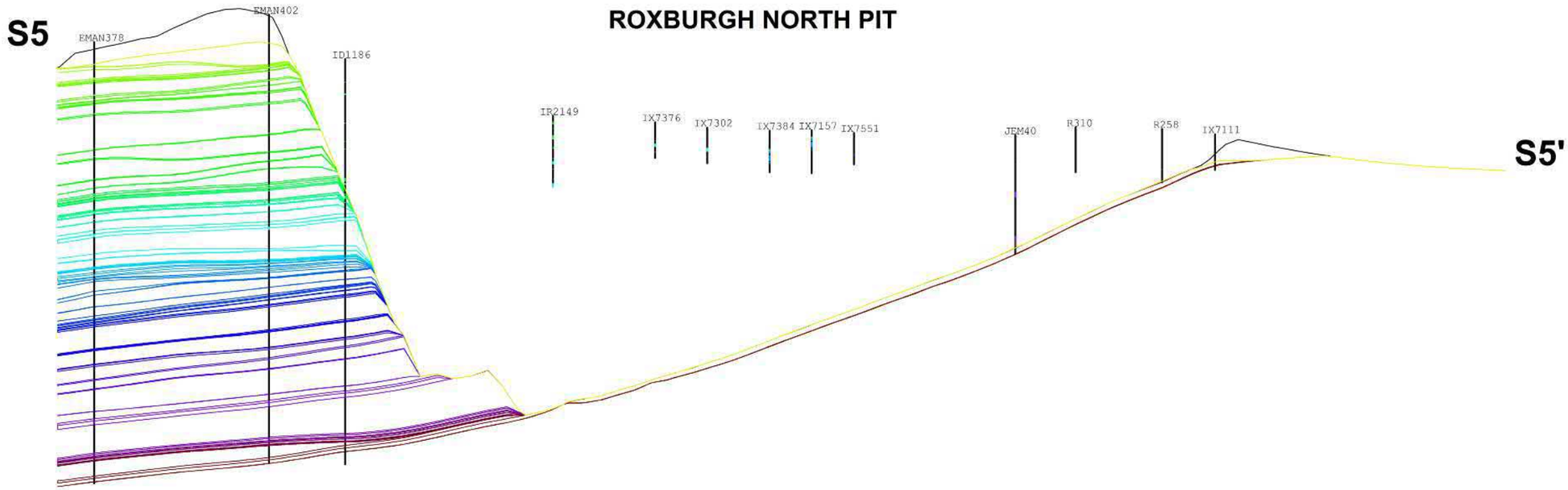
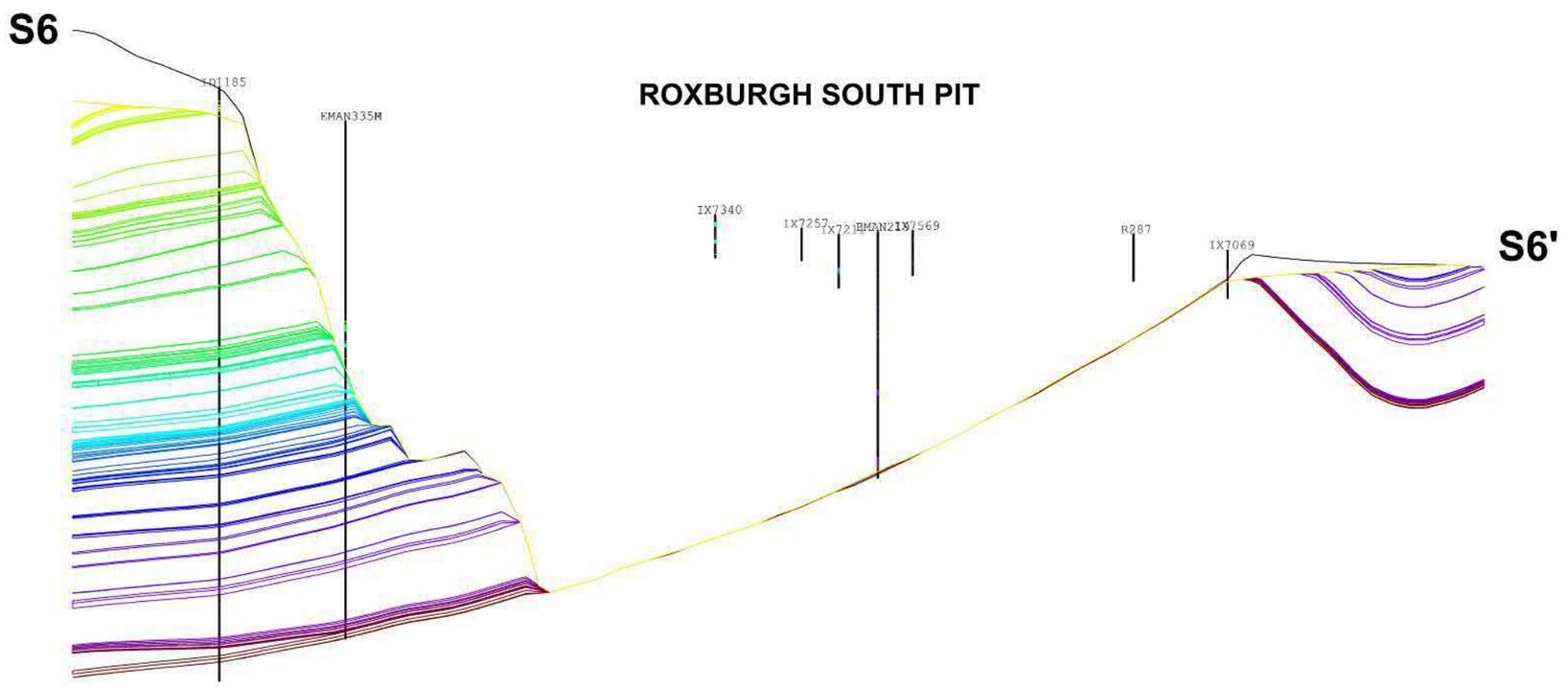
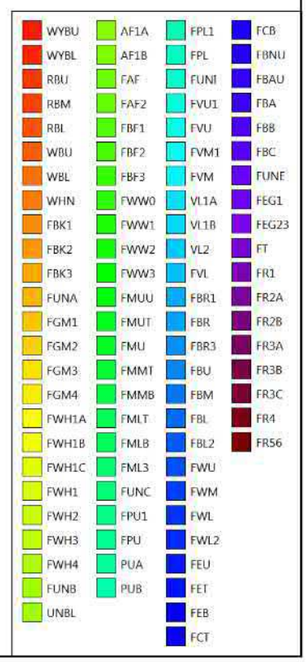
Topographic Surface from 23-06-2019 Prime
Base of Weathering Grid from Feb-2017
F-section Grids from model MAC_1017

ROXBURGH NORTH PIT



ROXBURGH SOUTH PIT





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MT ARTHUR MINE

MAC Cross Sections

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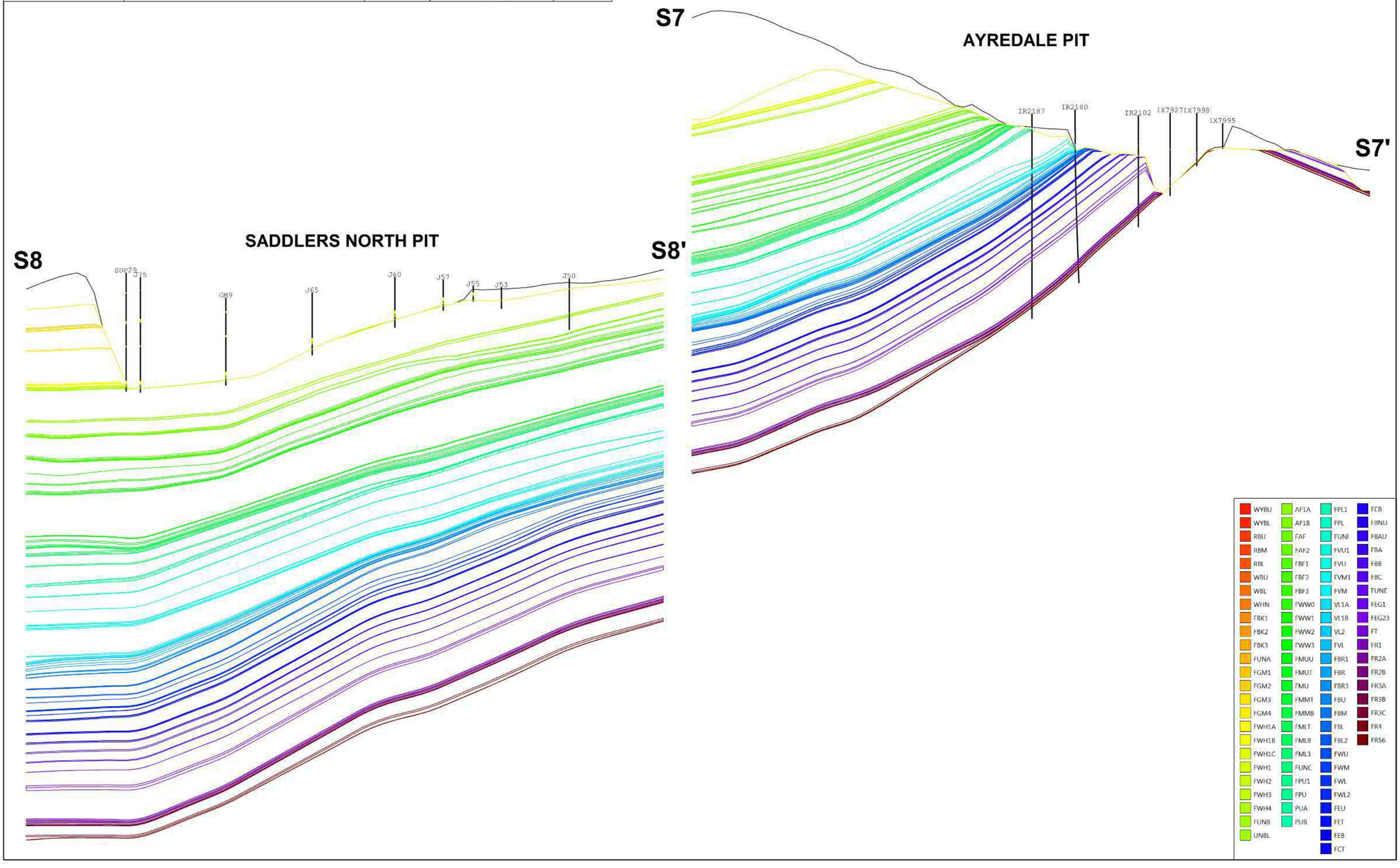
Topographic Surface from 23-06-2019 Prime
Base of Weathering Grid from Feb-2017
F-section Grids from model MAC_1017



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Kilometres

300% Vertical Exaggeration

MT ARTHUR MINE

MAC Cross Sections

Drawn: weslb3	Date: 07/07/2019	Revision: 0	Figure:
	Filename: MAC_A3_MSC_Sections_20190707		

Topographic Surface from 23-06-2019 Prime
Base of Weathering Grid from Feb-2017
F-section Grids from model MAC_1017

SADDLERS SOUTH PIT 1

S9

S9'

OD1106

OD1145

SSI10

SSI16

SSWL25A

SSWL27

SSWBM206

SADDLERS SOUTH PIT 2

S10

S10'

BR2005

SSI11

BM280

SSWL31

L37

WYBU
WYBL
RBU
RBM
RBL
WBU
WBL
WHN
FBK1
FBK2
FBK3
FUNA
FGM1
FGM2
FGM3
FGM4
FWH1A
FWH1B
FWH1C
FWH1
FWH2
FWH3
FWH4
FUNB
UNBL

AF1A
AF1B
FAF
FAF2
FBF1
FBF2
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FMUU
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FWL2
FEU
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FEB
FCT

FCB
FBNU
FBAU
FBA
FBB
FBC
FUNE
FEG1
FEG23
FT
FR1
FR2A
FR2B
FR3A
FR3B
FR3C
FR4
FR56

7 Rehabilitation Risk Assessment

7.1 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 5. 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 around Novemeber each year.

An assessment of environmental risks associated with the operation was undertaken as part of the Modification Project Environmental Assessment and has been referenced in the assessment of environmental risks in this MOP. 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 6. Details of the existing and proposed environmental management controls for the identified risks are provided in Section 3.2.

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 6: Rehabilitation 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
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

7.2 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 presented in Table 6. Further detail is presented in the site procedures as listed in Appendix 2, most importantly the Rehabilitation and Ecological Monitoring Procedure specifies the required management of rehabilitation from monitoring to maintenance.

General dust management of exposed areas is managed as per the dust management processes detailed in the approved Air Quality Air Quality and Greenhouse Gas Management Plan.

- For example: Deploying water carts across site for haul road dust suppression;
- Using dedicated water carts for contractor operations such as topsoil stripping;
- Changing dumping strategies to low areas during strong winds;
- Progressively rehabilitating mine surfaces; and
- Aerial seeding of exposed overburden where practicable.

7.2.1 Geotechnical / Geochemical

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 MAC, with pit walls continually intersecting various faults and dykes at different angles. It will also allow HVEC 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 HVEC 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.

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). The assessment was also completed in the FLDP.

The geomorphic design method used is an adaptation of the Geofluv™ approach and is currently being used on several emplacements across MAC. The Geofluv™ 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 have Geofluv™, 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.

Coal-associated strata includes some material that indicated a potential for acid generation. Therefore, all coal-associated overburden (and coarse rejects) requires selective handling and burying at depths greater than 5m. This is reflected in the emplacement design and construction requirements contained in the Mt Arthur Coal Dump Standard.

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. Soil management measures are detailed further in the Soil Types and Suitability section, below.

- 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;
- rock mulch is placed into some of the steeper drainage lines, 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 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 will have done the gap assessment for MAC by end of FY20.

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.

7.2.2 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 following spreading of seed.

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.

7.2.3 Soil Types and Suitability

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 in accordance with the Land Management Procedure. 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. Management measures for ensuring the maintenance of topsoil quality and volume during stripping, handling, stockpiling and placement are also presented in the Land Management Procedure, including:

- disturb the minimum area necessary for mining and associated infrastructure;
- stripping depths and limits (including areas of no recovery) are to be clearly delineated with survey pegs, and adhered to during stripping operations;
- clearing and topsoil removal activities must be checked at regular intervals to ensure continued effectiveness of stripping methods and management of topsoil;
- clearing and topsoil stripping should be limited to daylight hours where possible;
- during topsoil stripping and stockpiling the process avoids structural degradation of soils – taking particular care to avoid excessive compaction (i.e. avoiding re-handling and limit stripping activities in wet conditions);
- direct topsoil placement from stripping onto prepared rehabilitation areas is maximised, and double handling (relocation of stockpiles) minimised through planning;
- Topsoil stockpiles shall be:
    - no greater than 3 metres in height with preference for less than 1.5m in height for storage greater than 12 months;
    - located away from drainage lines, operational areas, and proposed disturbance areas;
    - managed to minimise run-on and minimise sediment laden run-off;
    - surveyed and recorded on mine plans;
    - ripped and sown with a pasture seed mix (where planned to remain for longer than 6 months); and
    - inspected periodically and, if required, treated for weed infestation.

Due to the proximity of the proposed rehabilitation areas (i.e. VD1 and CD1) to local population centres such as Muswellbrook, dust generation and visual impacts are an important consideration in project planning. The following controls are particularly pertinent to topsoil operations:

- roads (including minor tracks) used to haul topsoil are watered and maintained to suppress dust.
- Stripping operations are not to be undertaken in periods of high wind (>9m/s) unless dust generation is being effectively controlled.
- In order to reduce dust during stripping operations, stripping areas shall be pre-watered using a water cart.
- Vehicles are to follow defined haul roads or haulage routes that are being watered.
- In periods of high wind or dust generation, the –relevant mining supervisor may require operations to be modified or ceased in order to ensure compliance with statutory requirements.

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.

7.2.4 Water Management

Water at Mt Arthur Coal is managed in accordance with the following documents:

- Site Water Management Plan;
- Surface Water Monitoring Program;
- Site Water Balance; and
- Surface and Ground Water Response Plan.
- Site Water Management Plan;
- Ground Water Monitoring Program; and
- Surface and Ground Water Response Plan.

The aims of the site water management system are to minimise adverse impacts on downstream receiving waters (comprising Hunter River tributaries such as Saddlers Creek, Quarry Creek, Ramrod Creek, Fairford Creek and Whites Creek), and outline management measures for managing onsite water resources. The regeneration program targeting Hunter Valley Floodplain Red Gum Woodland (HFR) vegetation will be restricted to the Saddlers Creek Conservation area, which will be the only onsite post-mining landscape that provides suitable landform and drainage conditions.

The surface water monitoring program consists of scheduled sampling of downstream waters and rain event sampling. The monitoring program also includes impact assessment criteria, which if exceeded, trigger a management response, generally consisting of an investigation, reporting, and if required, remedial action.

The site water management plan aims to minimise any adverse impacts on groundwater resources in proximity to Mt Arthur Coal operations, including aquifers associated with hard rock coal measures and the Hunter River shallow alluvial deposits.

The groundwater monitoring program consists of the scheduled sampling of a network of groundwater piezometers. Permeability testing is also undertaken during installation of new monitoring bores to determine local groundwater flow conditions. The monitoring program also includes impact assessment criteria, which if exceeded, trigger a management response, generally consisting of an investigation, reporting, and if required, remedial action.

7.2.5 Contaminated Land and Hazardous Substances

Contaminated land at Mt Arthur Coal is managed in accordance with the following documents:

- Permit to Disturb (PtD);
- Spill Response Procedure;
- Pollution Incident Management Response Plan;
- Contaminated Land Management Procedure; and
- Hazardous Materials Management Procedure.

These documents outline the requirements for the handling, transport, storage, use and disposal of hydrocarbons and other hazardous substances at Mt Arthur Coal. These materials are kept in designated storage facilities, designed and managed in accordance with relevant standards and procedures.

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.

Monitoring and inspection programs are maintained for these facilities, to ensure hazardous materials and substances are being adequately stored and disposed and that any spills or leaks are promptly reported and managed. These documents also detail the protocols to be observed in the event of an environmental incident, to ensure incidents are managed in a manner that reduces the potential for pollution impacts, and meets regulatory reporting obligations.

7.2.6 Flora and Fauna

Flora and fauna at Mt Arthur Coal is managed in accordance with the following documents:

- Biodiversity Management Plan;
- Rehabilitation and Ecological Monitoring Procedure; and
- Land Management Procedure.

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.

The Biodiversity Management Plan incorporate measures to ensure these requirements are met. 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 nesting/roosting boxes, and hollow bearing trees recovered during vegetation clearing. Where practical, large surface rocks raked clear during preparation for pasture rehabilitation are placed in piles amongst, or adjacent to, remnant or rehabilitated vegetation as habitat features. The diversity of structure improves the potential biodiversity capability.

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 8.1.

The weed, pest and bushfire management measures outlined in this Section 7.2 also apply to site rehabilitation areas, thereby enhancing biodiversity value and fauna/flora protection within those areas.

Annual ecological monitoring surveys have been completed as part of this program first established in 2003 and designed to meet 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 comparison of rehabilitated/regenerated areas with relevant baseline information, reference sites, progress indicators and completion criteria as listed in the RMP;
- identify requirements for maintenance or remedial treatment; and
- meet statutory and corporate requirements relating to rehabilitation and ecological monitoring.

Specifically, the Ecological Development Monitoring Program objectives are to collect sufficient information 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 in the RMP; and,
- identify requirement for maintenance activities, remedial action, or modification to rehabilitation, regeneration or land management programs.
    - Drought affected areas have impacted progress for some woodland rehabilitation over the life of MAC. 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 12.2. subsequent assessment has identified trial options for VD1 and these are explained in the research and trial section of the RMP.

Flora diversity, structural complexity and fauna diversity recorded are compared to reference vegetation by suitably qualified personnel with progress over time reviewed against criteria. The process and location of reference sites is documented in the Rehabilitation and Ecological Monitoring Procedure. An assessment of current status is provided against reference sites as well as recommendations for remedial and/or maintenance actions. A summary of the monitoring is provided in the Annual Environmental Management Report.

7.2.7 Heritage (Aboriginal)

Aboriginal cultural heritage at Mt Arthur Coal is managed in accordance with the DP&E approved Aboriginal Heritage Management Plan (AHMP). The AHMP assists to mitigate the impacts of operations on Aboriginal cultural heritage, comply with the requirements of the National Parks and Wildlife Act 1974, EP&A Act and the Project Approval, and continue its active partnership with the Aboriginal community.

The AHMP provides the framework to identify, assess, monitor, conserve and manage Aboriginal cultural heritage identified on land owned by Mt Arthur Coal.

7.2.8 Spontaneous Combustion

Spontaneous combustion at Mt Arthur Coal is managed in accordance with the following documents:

- Spontaneous Combustion Control Program; and
- Overburden Handling and Coal Extraction Procedure.

Spontaneous combustion at Mt Arthur Coal is predominantly confined to old mining areas in the Bayswater No. 2 and the 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).

The Spontaneous Combustion Control Program contains details on measures implemented to identify, assess, handle, treat and monitor spontaneous combustion, and materials with potential to cause spontaneous combustion. Such measures include:

Guidelines for overburden emplacement and coal stockpile design to minimise Spontaneous combustion potential;

Guidelines for handling of high Spontaneous combustion potential material, such as "…potential spontaneous combustion material should be placed in thin layers, only in the designated active emplacements, and to be rapidly buried with inert cover to a minimum depth of 10 metres";

Monthly inspections of the Bayswater No. 2 and Drayton sublease area, and other reported outbreak areas, to identify and monitor indicators of spontaneous combustion, including surface cracking, visible smoke, and carbonaceous combustion odour. Active management occurs, including capping identified spontaneous combustion areas.

7.2.9 Bushfire

Bushfire at Mt Arthur Coal is managed in accordance with the:

- Bushfire Prevention Procedure; and
- Emergency Procedure – Bushfires.

The above procedures document fire prevention and control measures to reduce the risk of bushfire ignition on Mt Arthur Coal owned land, and to protect the operations from bushfire. Specific 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.

Preventative measures 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.

7.2.10 Weed and Pest Management

Weed management at Mt Arthur Coal is managed in accordance with the:

- Biodiversity Management Plan;
- Land Management Procedure; and
- Pest Animal Management Procedure.

Weed management at Mt Arthur Coal (including offset areas) consists of two major programs: the weed assessment program and weed treatment program. The assessment program consists of the periodic inspection of all Mt Arthur Coal owned land (except operational areas such as open cut pits) by experienced weed contractors, to delineate, assess and record weed distribution, and recommend weed treatment priorities. This is supported by regular inspections conducted by Mt Arthur Coal staff and feedback from mining personnel, contractors and lessees to identify areas of weed infestation. The treatment program involves the seasonal treatment, mainly through chemical spraying, of the highest priority weed infestations.

Improvements to these programs include the use of weed assessment data obtained during ecological monitoring and incorporation of better measures of weed infestations. A trial using high resolution aerial imagery to assess weeds in rehabilitation areas is currently being undertaken.

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.

The BMP details the measures Mt Arthur Coal has implemented to protect and enhance biodiversity values on site and within offset and conservation areas.

7.2.11 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 MOP period.

7.2.12 Other Considerations

Visual: 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. As discussed in Section 1.4.2– agreement has also been reached with the Mt Arthur CCC regarding modifications to the rehabilitation strategy to minimise visual impact, by revegetating the north facing bund with woody vegetation.

Public safety: Mt Arthur Coal has completed the installation of a security fence around the perimeter of its site to ensure no unauthorised access to mining areas. The fence has been installed on land owned by Mt Arthur Coal along the general alignment of the existing fence line.

8 Rehabilitation Implementation

8.1 Life of Mine Progressive Rehabilitation Schedule

MAC dig and dump has been constrained at the northern end. As a result this has slowed the advancement of the northern emplacement and pushed mining intensity to the southern areas of the main pit. Over the past 2 years, MAC has been through a comprehensive opportunity assessment to determine the most effective plan for rehabilitation and mining to deal with this constraint. The most recent inclusion is the main pit realignment to reduce the obtuse angle between the endwall (north) and advancing highwall to transition back to 90 degrees. By doing this, the northern emplacement adjacent to Denman Road will be accelerated and rehabilitation will be released more consistently across the years.

The eastern and southern areas of the main emplacement are not available for rehabilitation consistently in the near term due to the size and height of the final dump and the time to take to reach its outer limits. The tailings dam is also a hard constraint on the eastern perimeter of the mine. Additionally, the two south west out of pit emplacements are being placed in a way that will maximise rehabilitation and minimise the amount of time an open face would be visible from off the mine site (south west direction). Rehabilitation at Mt Arthur Coal out to 2026 can be seen in Figure 12. Rehabilitation areas year on year are forecasts and indicative only beyond the three year AFP. The numbers will be updated in the AFP and reported on in the annual report.

Rehabilitation timing at MAC is reliant on the dumping, shaping, top soiling and seeding timing. Areas that are dumped and shaped may not be top soiled and seeded for several months if the season is not suitable for these activities. Efforts are put into getting the timing right to reduce duration of exposed areas. If areas are going to be exposed for longer periods then other temporary stabilisation options are used, such as aerial seeding. Using this method the rehabilitation when seeded will have the best chance of survival and success.

ML1757
AUTH171
ML1655
ML1487
ML1548
MPL263
CCL744
CL396
ML1739
ML1739
CL395
ML1739
AUTH437
ML1548
CL229
EL5965
ML1739
ML1593S
ML1593
ML1358
AUTH437

LEGEND

Current Rehabilitation

Planned Rehabilitation

FY20
FY21
FY22
FY23
FY24
FY25
FY26

BHP

Mapping Services Brisbane

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

Transverse Mercator Projection.
MGA Zone 56. GDA94 Datum.

MOUNT ARTHUR COAL

REHABILITATION PLAN TO FY26

Drawn: B. Kleinschmidt	Checked: K. Brake	Date: 15/7/2019	Revision: 0	Filename: MAC_RehabPlanFY26	Plan 10

8.2 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 during this MOP, the phases nominated for the Mt Arthur Coal closure planning process consist of:

(Operational – those areas still actively used for mining, or mining related operations)

8.2.1 Active Mining - All four open cut pits are currently used for mining purposes. North Pit is the main active pit for coal extraction, and Saddlers Pit is primarily used for overburden emplacement. Belmont and MacDonalds pits are used as active water storages for mine and process water. Belmont and MacDonalds pits have been partially rehabilitated.

8.2.2 Decommissioning – removal of hard stand areas, buildings, contaminated materials, hazardous materials; Tailings Storage facilities at Mt Arthur Coal currently consist of the West Cut Tailings Dam, East Pit and North Cut Tailings Dam, with tailings dams SP1, SP2 and SP3 having been decommissioned and capped in 2012. Tailings dams SP1, SP2 and SP3 are located within the footprint of the dam wall for the Tailings Expansion Project Stage 2. The objective of the capping these dams was to ensure stability of the proposed overlying dam wall. The voids above the tailings surfaces were backfilled up to the crest level of the perimeter embankments with sedimentary mine overburden material. To ensure safe and stable capping, filling of SP1 and SP2 voids was completed in two discrete layers. SP3 was backfilled in six layers, with placement restrictions observed for the first two layers. The final surface was graded to form a free draining surface.

8.2.3 Landform Establishment – incorporates gradient, slope, aspect, drainage, substrate material characterisation and capping of hostile materials;

8.2.4 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;

8.2.5 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;

8.2.6 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

8.2.7 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 10.2), 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 5 shows the relationship between the management domains adopted for the Mt Arthur Coal closure and rehabilitation planning process, and the applicable rehabilitation phase for that domain.

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.

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. Native grass species have also been used to a greater extent in recent years, as discussed below.

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 isn't wasted due to adverse conditions.

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.

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.

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.

Pasture rehabilitation areas are cultivated and broadcast sown with the pasture seed mix in a single pass. The pasture seed mix generally used by Mt Arthur Coal is shown in Table 7. This mix is subject to change depending on results, landscape and expert advice and may change within the MOP period.

Table 7. 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

Areas of Box Gum Woodland (and Native Woodland) rehabilitation will be seeded with a tree, shrub and grass seed mix targeting the establishment of Upper Hunter Box-Ironbark Woodland vegetation community (which is the same community as Central Hunter Box-Ironbark Woodland). In 2018, as advised by the monitoring consultant couch grass has been removed from the seed mix The seed mix also includes an exotic sterile cover crop to assist with initial slope stabilisation, weed and dust control, while native vegetation establishes. Due to the wide range of seed size and weight, the woodland seed mix is broadcast sown in two passes. The Box Gum Woodland seed mix used by Mt Arthur Coal is shown in Table 9.

This seed mix has been introduced to achieve the targeted community structure and species composition for Central Hunter Box-Ironbark Woodland, as presented in Table 9. The woodland mix in Table 8 is a guide and subject to change within the RMP period due to analysis of results, and expert advice.

Table 8: Mt Arthur Coal Native Woodland Seed Mix

Common name	Species	Seed mix (kg/ha)
Narrow-leaved ironbark	*Eucalyptus crebra*	1.0
White box	*Eucalyptus albens*	0.8
Spotted gum	*Eucalyptus maculata*	0.3
River red gum	*Eucalyptus camaldulensis*	0.4
Kurrajong	*Brachychiton populensis*	0.3
Golden wattle	*Acacia longifolia*	1.0
Barbed wire grass	*Cymbopogon refractus*	0.5
Wallaby grasses	*Austrodanthonia sp.*	0.5
Rough spear grass	*Austrostipa scabra*	0.5
Shirohie millet	*Echinochloa esculenta*	5.0
Total		10.3

Note: variations to seed mix can occur from year to year

Table 9: Mt Arthur Coal Box Gum Woodland seed mix

Common Name	Species name	Seed mix (kg/ha)
Narrow-leaved Ironbark	*Eucalyptus crebra*	0.2
White Box	*Eucalyptus albens*	0.3
Grey Box	*Eucalyptus moluccana*	0.3
Blakely's Red Gum	*Eucalyptus blakelyi*	0.3
Kurrajong	*Brachychiton populensis*	0.2
Showy Wattle	*Acacia decora*	0.3
Kangaroo Thorn	Acacia paradoxa	0.3
Lightwood	*Acacia falcata*	0.2
Hickory Wattle/Silver-leaved Wattle	*Acacia implexa*	0.2
Sticky hop-bush	*Dodonaea viscosa spatulata*	0.3
Black she-oak	*Allocasuarina littoralis*	0.2
Native blackthorn	*Bursaria spinosa*	0.1
Mixed endemic grass seed	*Cymbopogon refractus, Bothriochloa decipiens, Bothriochloa macra, Dichanthium sericeum, Chloris truncata, Aristida sp., Sporobolus creber*	2.0
Slender spear grass	*Austrostipa verticilata*	0.05
Coolabah Oats (winter)	*Avena Sativa*	5.0

Note: variations to seed mix can occur from year to year.

Establishment of key canopy and understorey species of the Central Hunter Box – Ironbark Woodland community (Table 10) on areas of VD1 previously rehabilitated as pasture will continue during this MOP period. Vegetation establishment works will include intensive weed treatment, pasture slashing, ripping of planting line, tubestock planting of target species, and follow up guarding and watering, if required.

Temporary stabilisation works, such as the aerial seeding of exposed overburden surfaces not ready for final rehabilitation, will continue throughout this MOP period. The aerial seeding of these overburden surfaces with a pasture mix of hardy, fast-growing grass, form and legume species has produced promising results and assisted with reducing wind-blown dust generation. The seed mix used in the aerial seeding program was selected based on advice provided by a Hunter Valley based agronomist. The species included are grass and legume species commonly used across the Hunter Valley and that are hardy and quick to establish.

Table 10: Species composition and community structure criteria for targeted vegetation communities.

Proposed Rehabilitation Vegetation			
Planned Vegetation Community	Target Condition		
	Canopy	Understorey	Ground Cover
Central Hunter Box - Ironbark Woodland	10-40% cover dominated by either grey/white box hybrids (Eucalyptus albens x moluccana), or narrow-leaved ironbark (Eucalyptus crebra).	1-10% cover comprising regrowth of canopy species as well as Cassinia quinquefaria, western golden wattle (Acacia decora), kangaroo thorn (Acacia paradoxa), native blackthorn (Bursaria spinosa), western boobialla (Myoporum montanum), and native olive (Notelaea microcarpa var. microcarpa).	Up to 85% cover and between 0.1 to 1m in height and containing target species as described in Section 4.3.1 of the Baseline Ecological Study of Mt Arthur Coal Biodiversity Offset and Conservation Areas (Umwelt, 2013).
Hunter Floodplain Red Gum Woodland Complex (Saddlers Creek Conservation Area only)	Up to 20% cover. Dominated by yellow box (Eucalyptus melliodora), grey/white box hybrids (Eucalyptus albens x moluccana), red gum hybrids (Eucalyptus blakelyi x tereticornis), Blakely's red gum (Eucalyptus blakelyi) and forest red gum (Eucalyptus tereticornis). In some areas swamp oak (Casuarina glauca) and rough-barked apple (Angophora floribunda)	Up to 20% cover comprising regrowth of canopy species as well as cooba (Acacia salicina) and native olive (Notelaea microcarpa var. microcarpa).	Up to 95% cover between 0.1 to 1m in height and containing target species as described in Section 4.3.2 of the Baseline Ecological Study of Mt Arthur Coal Biodiversity Offset and Conservation Areas (Umwelt 2013).
Central Hunter Ironbark - Spotted Gum – Grey Box Forest	Up to 30% cover dominated by spotted gum (Corymbia maculata).	1-10% cover comprising cooba (Acacia salicina), native olive (Notelaea microcarpa var. microcarpa), native blackthorn (Bursaria spinosa), shiny-leaved canthium (Psydrax odorata) and western boobialla (Myoporum montanum).	Up to 70% cover between 0.1 to 1m in height and containing target species as described in Section 4.3.9 of the Baseline Ecological Study of Mt Arthur Coal Biodiversity Offset and Conservation Areas (Umwelt, 2013).

8.3 Rehabilitation of areas affected by 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 MOP period.

9 Rehabilitation Quality Assurance Process

The monitoring program requirements will be audited as part of the Mt Arthur Coal Assurance Audit Program, and as part of the Land and Biodiversity audits. During the undertaking of field monitoring programs, the Advisor Environment is to supervise the monitoring activities and practices to ensure they are being undertaken in accordance with this procedure and the Mt Arthur Coal Health and Safety System.

The Mt Arthur Coal ecological monitoring program uses an Annual Rapid Assessment (ARA). Monitoring locations have been chosen in consultation with expert consultants. The ARA includes:

- A desktop review of latest aerial photography and previous ARA's to identify potential areas of concern;
- a field walkover of all subject areas to identify, photograph and determine corrective actions for all identified areas of concern; and
- measurements, such as size, depth, width, active/non-active, erosive or depositional and record on the ARA form.

In addition to the above, an inspection will occur post rainfall events of newly established rehab with less than 70% ground cover. Within this inspection the following criteria will be assessed:

- Effectiveness of contours (if present);
- Identification and evaluation of any area of active/potential erosion; and,
- Rapid assessment of newly established rehab for level of groundcover percentage to
- determine if future monitoring is required under this program.

The ARA is undertaken:

- Within three to six months of ecosystem establishment (post seeding), and then annually;
- For at least five years; and
- Until the area/structure is determined to be stable by an independent expert.

Further detail is located within Section 10 and within the Mt Arthur Coal REMP document.

10 Rehabilitation Monitoring Program

10.1 Rehabilitation Monitoring

These 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 Mining Operations Plan (MOP);
- 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
- Ecological Development
- Grazing Potential

10.1.1 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. An inspection checklist is completed and signed by both contractor and site representative to show compliance.

The specific EDMP objectives are to: Show 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 from section 5; and Identify requirements for maintenance activities, remedial action, or modification to rehabilitation, regeneration or land management programs.

10.1.2 Landform stability monitoring

Landform stability monitoring program consists of an inspection regime for all rehabilitated areas, buffer land, final voids and offset and conservation areas to monitor long-term stability of rehabilitated and modified natural lands. The inspections consist of post-rehabilitation and annual rapid assessments, plus a five year inspection by a suitably qualified specialist. The aim of this program is to:

- show that all post-mining landforms are vegetated, stable and represent minimal risk of failure;
- identify areas of significant active erosion across Mt Arthur Coal owned land (except operational and infrastructure areas), and evaluate potential for environmental impact. Locations to target erosion assessment are identified using aerial photography; and
- determine the requirement for maintenance, remedial treatment or modification of rehabilitation measures.

10.1.3 Ecological development monitoring

Ecological development monitoring program consists of annual flora and fauna assessments (including reference sites), post-regeneration inspections and weed assessments for woodland rehabilitation areas and conservation areas, in order to:

- show 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 closure criteria);
- identify requirements for maintenance activities, remedial action, or modification to rehabilitation, regeneration or land management programs;
- reporting on General health of vegetation;
- evidence of natural regeneration;
- occurrence and abundance of weed species
- evidence of feral animals ; and
- revegetation success.

10.1.4 Grazing Potential

The Grazing Potential monitoring program consists of periodic ground and pasture assessments and grazing trials on those 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.

Stocking rates will be in the approximate range 7 – 9.5 dry sheep equivalent per hectare depending on the mix of breeding (>500kg) and growing cattle (300-500kg). Rotational grazing (for stocking rates in range mentioned above) or continuous grazing (for lower stocking rates) will be employed dependent on stocking densities. Monitoring will enable responsive changes to stocking rate and grazing regime as seasonal conditions vary.

Trigger points defining target conditions to achieve sustainable livestock production with best practice land management are listed below in Table 11.

Table 11: Trigger points to achieve sustainable livestock production

	Low (less than)	Ideal	Comment	Action Required
Ground cover	70%	90-100%	Ground cover includes higher slopes 80% cover	Reduce grazing pressure, encourage pasture regeneration
Perennial grass component of pasture	Minimum 40%	60-80%	Provides stable grassland base, must maintain some diversity	Increase perennial pasture component with strategic grazing
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	Monitor herbage mass and remove stock as required

Grazing infrastructure will include stock fencing and existing farm dams for water with back up reticulated water supply. Cattle will be excluded from riparian and woodland rehabilitation. Full scale drought feeding will not be conducted on these pastures, as damage to the pastures while feeding could be irreversible. Early destocking will be the preferred management if drought conditions are severe. Further detail on these programs is documented in the Rehabilitation and Ecological Monitoring Procedure (REMP).

10.2 Measuring Performance against Rehabilitation Objectives and Completion Criteria

Table 12. Measuring Performance against Rehabilitation Objectives and Completion Criteria

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
Phase – 1. Decommissioning							
Domain – 1. Open Cut Voids							
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.	2009 EA 2013 EA	No	N/A	Initial modelling undertaken as part of 2009 EA and further developed in 2013 EA.
	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.	2009 EA 2013 EA	No	yes	Assessment underway, with results expected in 2020.
	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	Closure Plan	No	yes	Annual
Domain – 2. Water Management Structures							
Existing water storage facilities decommissioned and remediated	Major dams (CHPP Dam, Main Dam and Environmental Dam) decommissioned	Inspection Report	Infrastructure removed.	Closure Plan	No	N/A	Decommissioning of the main dam is expected to be completed during this MOP period. Others not commenced.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Inspection Report	Dams de-watered and ground surface areas remediated (scalped or capped).	Closure Plan	No	N/A	Timing for decommissioning of main dam and dam 4 is listed in the AFP.
	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.	Closure Plan	No	N/A	Not commenced
	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.	Closure Plan	No	Yes	Not commenced
	Risk assessment and implementation of risk controls.	Inspection Report	Safety risks associated with remaining infrastructure identified and appropriately managed.	Closure Plan	No	Yes	
Domain – 3. Infrastructure Areas							
Infrastructure areas decommissioned and demolished, resulting in safe, stable and non-polluting landscape. (Ex-Infrastructure areas will be rehabilitated as per Rehabilitation – Pasture or	Status of retained infrastructure legally confirmed.	Legal instruments	Legal instruments established to prove transfer of ownership to another entity, or agreement to acquire, operate and manage retained infrastructure at mine closure.	Closure Plan	No	N/A	Not commenced
	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.	Closure Plan	No	Yes	Commenced for Bayswater No. 2 Infrastructure Area.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
Rehabilitation – Native Woodland for subsequent rehabilitation phases).	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.	EPL	No	Yes	Not commenced
				EPL PA 09_0062 MOD 1	No	Yes	A remedial action plan has been completed for the Bayswater No. 2 Infrastructure Area. PCB and asbestos register maintained by H&S staff.
	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.	Closure Plan	No	Yes	
Domain – 4. Existing Rehabilitation							

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
As per relevant Secondary Domain	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Domain – 5. Tailings Storage Facility (TSF)							
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 Overburden Emplacements for subsequent rehabilitation phases).	Assessment for potential acid generation, and incorporation of findings into capping design	As constructed reports	Capping of tailings.	2009 EA EPL 2013 EA	Yes	Yes	Geochemical assessment completed (2000). Further study underway.
	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.	As constructed reports	Construction of capping layer as per independent consultant's design, or minimum of 3m capping layer of inert material.	2009 EA Closure Plan 2013 EA	No	Yes	Completed for SP1, SP2 & SP3.
		Monitoring Reports	Monitoring regime established for downstream waters.	EPL 2009 EA 2013 EA	Yes	N/A	Monitoring regime established. SWMP approved by DP&E.
		Monitoring Reports	Monitoring indicates no evidence of capping instability or environmental harm.	DSC	No	Yes	SP1, SP2 and SP3 capped. No other dams have been capped. North Cut Tailings Dam will be capped as defined in the Annual Forward Program.
		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.	Closure Plan	No	Yes	

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
	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.	Closure Plan	No	Yes	Annual
Domain – 7. Onsite Conservation and Offset areas							
All onsite biodiversity offset and conservation areas will be managed to increase their biodiversity and habitat value, in accordance with the requirements of PA 09_0062 MOD 1, EPBC Approval 2011/5688, and the site Biodiversity Management Plan.	Long-term protection of biodiversity conservation areas.	Legal Instruments	Appropriate legal instruments in place to provide long-term protection to onsite biodiversity offset and conservation areas.	PA 09_0062 MOD 1 EPBC	No	N/A	Conservation Agreements in place
	Conservation areas free of unnecessary infrastructure that may pose risk to biodiversity values.	Inspection Report	No unnecessary infrastructure in place.	BMP/OMP	No	Yes	In progress.
		Inspection Report	Infrastructure have services disconnected and terminated and are demolished and removed.	BMP/OMP	No	N/A	In progress.
Phase – 2. Landform Establishment							
Domain – 1. Open Cut Voids							
Mining voids that remain in the rehabilitated post-	Final void walls will be treated to ensure human	As constructed designs	Void low walls are to be reshaped with slopes of approximately 18 degrees.	2009 EA, 2013 EA, MOP	No	Yes	Not commenced

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
mining landscape will be safe, stable and non-polluting.	and animal safety and geotechnical stability.	As constructed designs	Void high walls reshaped to approximately 37 degrees and, if required, protected with berm and trench, or fencing and signage, depending on risk.	2009 EA, MOP	No	Yes	Not commenced
		Geotechnical report	Final voids have been inspected by a qualified geotechnical engineer to validate that it is stable and poses acceptable safety risk.	2009 EA, MOP	No	Yes	Not commenced
	Final void does not cause harmful impact on downstream waters (surface or groundwater).	Hydrological report Inspection report	Implementation of management measures from hydrological report.	2009 EA	No	N/A	Initial modelling undertaken as part of 2009 EA.
		Monitoring reports	Monitoring regime established for downstream waters.	EPL, SWMP	Yes	N/A	Monitoring regime established
		Monitoring reports	Monitoring indicates no evidence of harmful impact on downstream waters.	EPL, SWMP	Yes	Yes	Monitoring in progress
Domain – 2. Water Management Structures							
Decommissioned mine water management facilities re-habilitated to stable and non-eroding landforms and/ or watercourses.	Drainage paths re-established to achieve stable and non-polluting landscape.	As constructed report	Drainage lines re-instated.	2009 EA Closure plan 2013 EA	No	Yes	Not commenced. Study underway in FY20.
		As constructed report	Adjacent disturbed area reshaped, to maximise sheet flow.	2009 EA Closure plan 2013 EA	No	Yes	Not commenced

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
Long-term stability of remaining water management structures.	External engineer's assessment report, indicating that the flood levy is stable and flood-proof, with no evidence of slumping, and continued function and stability of sub-surface cut off wall.	External engineer's assessment report	Demonstrated long-term stability and function of Hunter River alluvials cut-off wall and flood levy.	Controlled Activity Approval	No	Yes	Alluvial wall & flood levy completed. Regular inspections of area completed by Civil Engineer to ensure stability.
Domain – 6. Overburden Emplacements							
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 rehabilitated as per Rehabilitation – Pasture, Rehabilitation – Native Woodland or Rehabilitation – Box Gum Woodland for	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.	2009 EA 2013 EA	No	Yes	Completed annually for established rehabilitated areas.
		Inspection report	Field monitoring of surface drainage infrastructure demonstrates that constructed drainage features are functioning as designed with no significant failures.	2009 EA 2013 EA	No	Yes	In progress.
		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 DRG approval and appropriate management.	2009 EA 2013 EA	No	Yes	Completed for established rehabilitated areas.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
subsequent rehabilitation phases).	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.	2009 EA Dump Standard 2013 EA	No	Yes	Geochemical assessment completed (2000). In progress.
		Inspection report	Absence of hazardous carbonaceous material on the surface of the rehabilitation.	2009 EA Dump Standard 2013 EA	No	Yes	In progress.
		Inspection/Monitoring report	No active spontaneous combustion areas, as evidenced through established monitoring program.	2009 EA Dump Standard 2013 EA	No	Yes	In progress.
	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.	2009 EA 2013 EA	No	N/A	In progress. No emplacements exceeding 360m to date.
		Visual Assessment Reports	Condition 4 of the Visual Assessment Procedure is achieved	2009 EA 2013 EA	No	N/A	In progress
		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.	2009 EA 2013 EA	No	Yes	In progress
Phase – 3. Growing Media Development							
Domain – B. Water Management Areas							

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
Decommissioned mine water management facilities re-habilitated to stable and non-eroding landforms and/ or watercourses. (Re-instated drainage lines will be rehabilitated as per Rehabilitation – Native Woodland or Rehabilitation – Box Gum Woodland for subsequent rehabilitation phases).	Reshaped or re-instated drainage will be topsoiled and rehabilitated to promote stable and non-polluting landscape.	As constructed report	Topsoil will be placed to a minimum depth of 100mm across all disturbed ground and drainage lines. Topsoil substitutes (i.e. protective matting or hydromulching) may be used to reduce sediment potential.	2009 EA 2013 EA Grigg et al Blue Book Vol2E	No	Yes	In progress
Domain – C. Rehabilitation - Pasture							
Rehabilitated pasture landscapes will support a financially viable and environmentally sustainable livestock grazing operation.	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.	Agronomist	No	Yes	In progress.
		Sampling results	Topsoil will have the following properties, as demonstrated through field survey and analytical testing (including re-rehabilitation stockpile testing). Physical Texture typically: Silty clay loam to sandy loam, with clay content < 30% Structured soils - not massive (heavy clay) or single grained (sand) Sub-optimal soils treated with gypsum at rate of ~10 tonnes/ha	Elliot & Veness	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Sampling Results	Chemical pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm Cation exchange capacity (CEC) >14 Cmol+/kg	Agronomist, Grigg et al, Blue Book Vol 2E	No	Yes	In progress.
		Sampling Results	Erosion Potential Emerson Aggregate Test Class of 3 (1), 3(2), 4, 5 or 6. Or exchangeable sodium capacity (ESP) <5%	Blue Book Vol 2E, Hazelton & Murphy	No	Yes	In progress.
		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	Agronomist, Blue Book Vol 2E, Hazelton & Murphy	No	Yes	In progress.
Domain – D. Rehabilitation – Native Woodland & Domain – E. Rehabilitation – Box Gum Woodland							
Rehabilitated areas will be able to support an open native woodland vegetation community to enhance biodiversity and habitat values.	Soils/ growth medium demonstrates physical and chemical properties suited to native woodland vegetation.	Inspection report	Topsoil placed at a minimum depth of 100 mm. Other growth media materials (i.e. biosolids or organic mulch) integrated with subsoil/spoil material as per relevant guidelines.	Grigg et al, Blue Book Vol 2E	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Sampling Results	Topsoil will have the following properties, as indicated through field monitoring. Clay content < 30% and not massive (heavy clay) or single grained (sand) 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.	Hazelton & Murphy, Elliot & Veness, Rawlings et al	No	Yes	In progress.
Phase – 4. Ecosystem and Landuse Establishment							
Domain – A. Final Voids							
Mining voids remaining in the rehabilitated post-mining landscape will be safe, stable and non-polluting.	Vegetative cover promotes landform stability and assists with water quality maintenance.	Inspection Report	Reshaped low wall rehabilitated as pasture or woodland vegetation (see relevant domain for detailed performance indicators).	See relevant domain C, D or E	-	-	-
	Landforms and water storages safe for humans, livestock and native wildlife, and non-polluting.	Inspection Report & Risk Assessments	Steep void walls and water storages isolated by berm and bench, or fencing and signage (depending on risk profile) to prevent unintentional vehicle, pedestrian and livestock access.	2009 EA 2013 EA	No	Yes	Not commenced
		Water Monitoring Results	Water monitoring indicates no harmful impact on surrounding surface and groundwater and is consistent with hydrological modelling predictions.	EPL 2009 EA 2013 EA	No	Yes	Sitewide surface water and groundwater monitoring in progress.
Domain – C. Rehabilitation - Pasture							

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
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	70 percent of vegetation established and maintained.	Blue Book Vol2E, Grigg et al	No	Yes	In progress.
		Inspection Report	Land surfaces within grazing areas are free of obstacles or hazardous terrain.	MOP	No	N/A	In progress.
		Inspection report	Appropriate infrastructure such access roads, fencing, and a water supply plan completed.	Agronomist , MOP	No	N/A	Not commenced.
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.	2009 EA 2013 EA Agronomist	No	Yes	In progress.
		Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Bushfire Prevention Procedure	No	Yes	In progress.
		Assessment reports	Pest animal infestation comparable to local remnant vegetation.	2009 EA 2013 EA	No	Yes	In progress
		Inspection report	No gullies greater than 20cm depth over transects.	2009 EA 2013 EA	No	Yes	In progress.
		Inspection report	Major rehabilitated watercourses and adjacent conservation areas fenced off to prevent livestock access.	2009 EA BMP 2013 EA	No	N/A	In progress.
Domain – D. Rehabilitation – Native Woodland							

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
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 Plan 4, planted with a native species mix (seed or tubestock) targeted at establishing an open grassy woodland vegetation community.	PA 09_0062 MOD 1, EPBC Approval	No	Yes	In progress.
	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 Section 7.2 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	PA 09_0062 MOD 1 BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	All structural dominant species represented compared with analogue site.	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
		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.	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
		Rehabilitation Assessment Report	The total number of native plant species is comparable to the local remnant vegetation.	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Rehabilitation Assessment Report	The number of tree, shrub and sub-shrub species is comparable to that of the local remnant vegetation.	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
	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 13.	PA 09_0062 MOD 1 BMP	No	Yes	In progress.
		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.	PA 09_0062 MOD 1 BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Number of weed species and surface area comparable to local remnant vegetation.	2009 EA 2013 EA	No	Yes	In progress.
		Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Bushfire Prevention Procedure	No	Yes	In progress.
		Rehabilitation assessment reports	Pest animal infestation comparable to reference sites.	2009 EA 2013 EA	No	Yes	In progress

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		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.	2009 EA BMP 2013 EA	No	N/A	In progress.
	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.	2009 EA BMP 2013 EA DRG Synoptic Plan	No	N/A	In progress – corridors planned.
	Domain – E. Rehabilitation – Box Gum Woodland						
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, and shown on Plan 4, will be established with a species mix (seed or tubestock) drawn from the species list presented in Section 8 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
		Rehabilitation Assessment Report	All structural dominant species represented compared with analogue site	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		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	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
		Rehabilitation Assessment Report	The total number of live native plant species is comparable to the local remnant vegetation	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
		Rehabilitation Assessment Report	The number of tree, shrub and sub-shrub species is comparable to that of the local remnant vegetation	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
	Rehabilitated Box Gum Woodland will enhance habitat and biodiversity values.	Rehabilitation Assessment Report	Establishment of groundcover, understory and canopy according to Table 13.	PA 09_0062 MOD 1 BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Fauna monitoring of natural and introduced habitat indicates colonisation by native species.	PA 09_0062 MOD 1 BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Number of weed species and surface area comparable to reference sites.	2009 EA 2013 EA	No	Yes	In progress.
		Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Bushfire Prevention Procedure	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Rehabilitation Assessment Report	Pest animal infestation comparable to reference sites.	2009 EA 2013 EA	No	Yes	In progress
Domain – F. Onsite Conservation and Offset areas							
All onsite biodiversity offset and conservation areas will be managed to increase their biodiversity and habitat value, and meet regulatory requirements.	Rehabilitation operations are completed in accordance with the biodiversity and rehabilitation management requirements of PA 09_0062 MOD 1 and EPBC Approval 2011/5688, and the site Biodiversity Management Plan.	Biodiversity Management Plan	Compliance with management actions presented in the site Biodiversity Management Plan, as evidenced through the most recent Independent Environmental Audit and/or Biodiversity Audit.	PA 09_0062 MOD 1 EPBC Approval BMP	No	N/A	Independent audits completed.
Phase – 5. Ecosystem and Landuse Sustainability							
Domain – A. Final Voids							
Mining voids remaining in the rehabilitated post-mining landscape will be safe, stable and non-polluting.	Vegetative cover promotes landform stability and assists with water quality maintenance.	Rehabilitation Assessment Report	Established pasture or woodland vegetation (see relevant domain for detailed performance indicators).	See relevant domain	-	-	-
	Landforms and water storages safe for humans, livestock and native wildlife, and non-polluting	Inspection Report and Risk Assessment	Steep void walls and water storages isolated by berm and bench, or fencing and signage (depending on risk profile) to prevent unintentional vehicle, pedestrian and livestock access.	2009 EA 2013 EA	No	Yes	Not commenced.
		Rehabilitation Assessment Report	Water monitoring indicates contaminants within acceptable limits.	EPL 2009 EA 2013 EA	No	Yes	Site wide surface water and groundwater monitoring in progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
Domain – C. Rehabilitation - Pasture							
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.	Blue Book Vol2E, Grigg et al	No	Yes	In progress.
		Inspection Report	Land surfaces within grazing areas free of obstacles or hazardous terrain.	MOP	No	N/A	In progress.
		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.	2009 EA 2013 EA	No	Yes	In progress.
		Inspection Report	Appropriate infrastructure such access roads and fencing, including fencing along drainage lines and adjacent woodland areas, maintained and functional.	BMP	No	N/A	In progress.
	Soil substrate and pasture cover that will support grazing.	Grazing Potential Assessment Report	Pasture grass cover established.	Agronomist	No	Yes	In progress.
		Grazing Potential Assessment Report	Carrying capacity (DSE/ha), crude protein (%), digestibility (%), green dry matter content (kg green DMA/ha) comparable to reference sites.	Agronomist	No	Yes	In progress.
		Grazing Potential Assessment Report	Number of weed species and surface area comparable to reference sites.	2009 EA 2013 EA Agronomist	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Bushfire Prevention Procedure	No	Yes	In progress.
		Monitoring Report	Pest animal infestation comparable to reference sites.	2009 EA 2013 EA	No	Yes	In progress
		Inspection Report	No gullies greater than 20 cm depth over transects.	2009 EA 2013 EA	No	Yes	In progress.
		Inspection Report	Major rehabilitated watercourses and adjacent conservation areas fenced off to prevent livestock access.	2009 EA BMP 2013 EA	No	N/A	In progress.
		Sample Results	Soil assessment as part of site monitoring program indicates: Minimum topsoil depth 100 mm, with further development of A horizon. minimal land degradation; no accelerated or concentrated erosion; pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm cation exchange capacity (CEC) >14 Cmol+/kg Emerson Aggregate Test Class of 3 (1), 3(2), 4, 5 or 6, or exchangeable sodium capacity (ESP) <5% Organic carbon levels (>4.0%) Soil Phosphorous (Colwell P) levels 14-20 mg/kg	Blue Book Vol 2E, Hazelton & Murphy, Elliot & Veness, Grigg et al	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
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.	Rehabilitation Assessment Report	Weed distribution comparable to reference sites.	2009 EA 2013 EA Agronomist	No	Yes	In progress.
		Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Bushfire Prevention Procedure	No	Yes	In progress.
		Rehabilitation Assessment Report	Pest animal infestation comparable to reference sites, with ongoing control.	2009 EA 2013 EA	No	Yes	In progress
		Inspection Report	No gullies greater than 20 cm depth over transects.	2009 EA 2013 EA	No	Yes	In progress.
		Monitoring Results	Monitoring of drainage lines indicates no significant concentrated/ accelerated erosion, and no downstream sedimentation or other degradation impacts.	2009 EA BMP 2013 EA	No	Yes	In progress.
Domain – D. Rehabilitation – Native Woodland							
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 maintained as native woodland.	Rehabilitation Assessment Report	All areas shown as Native Woodland vegetation community in Plan 4, planted with a native species mix (seed or tubestock) targeted at establishing an open grassy woodland vegetation community have been established.	PA 09_0062 MOD 1 EPBC	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
	Rehabilitated native woodland will be focussed on establishing the vegetation communities as required in Project Approval.	Rehabilitation Assessment Report	The developing vegetation community will include key species listed in Section 7.2 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	PA 09_0062 MOD 1 EPBC BMP	No	Yes	In progress.
	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.	PA 09_0062 MOD 1 BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Density and diversity of developing tree and shrub species within rehabilitated community is comparable to that of reference sites.	BMP/OMP	No	Yes	In progress.
		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.	BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Observations indicating reproduction (seeding, flowering or second generation plants) recorded at multiple locations within rehabilitated vegetation area.	BMP/OMP	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		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.	BMP/OMP	No	Yes	In progress.
		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.	PA, BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Weed trends comparable to reference sites.	2013 EA 2009 EA BMP/OMP	No	Yes	In progress.
		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.	2013 EA 2009 EA BMP/OMP	No	N/A	In progress.
	Rehabilitated native woodland vegetation will provide faunal habitat and movement corridors by linking existing vegetation communities within and surrounding the mine boundary.	Rehabilitation Assessment Report	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.	2009 EA 2013 EA DRG Synoptic Plan	No	N/A	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
	Soils/ growth medium displays physical and chemical properties suited to native woodland vegetation.	Sampling Results	Field monitoring indicates: Topsoil minimum depth of 100 mm, with further development of A horizon evident; no accelerated or concentrated erosion pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm Soil Carbon, Nitrogen and Phosphorous levels comparable with reference sites.	Blue Book Vol 2E, Hazelton & Murphy, Elliot & Veness, Rawling et al	No	Yes	In progress.
Domain – E. Rehabilitation – Box Gum Woodland							
Rehabilitation areas will include at least 500 ha of re-established Box Gum Woodland.	A minimum area of 500 ha rehabilitation will be maintained as Box Gum Woodland.	Rehabilitation Assessment Report	The Box-Gum re-establishment area as shown on Plan 4, has been established with species presented in Section 7.2 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	PA 09_0062 MOD 1 EPBC	No	Yes	In progress.
	Rehabilitated Box Gum 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.	PA 09_0062 MOD 1 BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Density and diversity of developing tree and shrub species within rehabilitated community is comparable to that of reference sites.	BMP	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		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.	BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Observations indicating reproduction (seeding, flowering or second generation plants) recorded at multiple locations within rehabilitated vegetation area.	BMP	No	Yes	In progress.
		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.	BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Colonisation by native species comparable with local remnant vegetation.	PA 09_0062 MOD 1 BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Weed presence is comparable to remnant vegetation.	2009 EA 2013 EA BMP	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		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.	2009 EA 2013 EA BMP	No	N/A	In progress.
	Soils/ growth medium displays physical and chemical properties suited to native woodland vegetation.	Inspection Report & Monitoring Results	Field monitoring indicates: Topsoil minimum depth of 100 mm, with further development of A horizon evident; no accelerated or concentrated erosion pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm Soil Carbon, Nitrogen and Phosphorous levels comparable with reference sites.	Blue Book Vol 2E, Hazelton & Murphy, Elliot & Veness, Rawling et al	No	Yes	In progress.
	Domain – F. Onsite Conservation and Offset areas						
All onsite biodiversity offset and conservation areas will be managed to increase their biodiversity and habitat value, and meet regulatory requirements.	Rehabilitation operations are completed in accordance with the biodiversity and rehabilitation management requirements of PA 09_0062 MOD 1 and EPBC Approval 2011/5688, and the site Biodiversity Management Plan.	Biodiversity Management Plan	Compliance with management actions presented in the site Biodiversity Management Plan, as evidenced through the most recent Independent Environmental Audit and/or Biodiversity Audit.	PA 09_0062 MOD 1 EPBC Approval BMP	No	N/A	Independent audits completed.
Phase – 6. Relinquishment							
Domain – A. Final Voids							

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
Mining voids remaining in the rehabilitated post-mining landscape will be safe, stable and non-polluting.	Vegetative cover promotes landform stability and assists with water quality maintenance.	Rehabilitation Assessment Report	Reshaped low wall areas rehabilitated as pasture or woodland vegetation meet relevant completion criteria for the relevant secondary domain.	See relevant Domain	-	-	-
	Landforms and water storages safe for humans, livestock and native wildlife, and non-polluting	Risk assessment & Inspection Report	Steep void walls and water storages isolated by berm and bench, or fencing and signage (depending on risk profile) to prevent unintentional vehicle, pedestrian and livestock access.	2009 EA 2013 EA	No	Yes	Not commenced.
		Inspection Report	Geotechnical inspections of residual steep landforms completed by independent engineer identifying: no areas of existing or immanent landform failure; and no potential long-term and/or high risk landform stability issues.	2009 EA 2013 EA	No	N/A	Not commenced.
		Water Monitoring report	Water monitoring indicates contaminants within acceptable limits.	EPL	No	Yes	Sitewide ground & surface water monitoring in progress and approved by DP&E.
Domain – B. Water Management							
Rehabilitated water management features will be re-instated and managed as stable, non-eroding and non-polluting landform features that either hold water (i.e. dams)	Water management features will be stable and non-polluting	Water Monitoring Report	Water leaving site is monitored in accordance with the relevant EPL (until EPL is surrendered).	EPL	Yes	Yes	Monitoring in progress.
		Water Monitoring Report	Discharged water quality is in the range of receiving watercourse background water quality.	EPL	Yes	Yes	Monitoring in progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
or allow the unimpeded flow of water (i.e. drainage lines and watercourses) as designed.		Rehabilitation Assessment Report	No concentrated or accelerated erosion in drainage lines compared to nearby non-mining disturbed drainage lines.	2009 EA 2013 EA	No	Yes	In progress.
		Rehabilitation Assessment Report	Rehabilitated drainage lines revegetated	See relevant Domain	-	-	-
		Inspection report	Appropriately fenced and signed to prevent unintended livestock and vehicle access.	2009 EA 2013 EA BMP	No	N/A	In progress.
Domain – C. Rehabilitation - Pasture							
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	At least 70 percent established and maintained.	Blue Book Vol2E, Grigg et al	No	Yes	In progress.
		Inspection Report	Land surfaces within grazing areas free of obstacles or hazardous terrain.	MOP	No	N/A	In progress.
		Grazing Potential Assessment Report	Rehabilitate at least 33 ha of Class II agricultural capability land in the area identified in the Project Approval.	2009 EA 2013 EA PA 09_0062 MOD 1	No	Yes	In progress.
		Inspection report	Appropriate infrastructure such access roads and fencing, including fencing along drainage lines and adjacent woodland areas, maintained and functional.	2009 EA 2013 EA Agronomist	No No	N/A N/A	In progress. Not commenced.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
	Soil substrate and pasture cover is able to support grazing.	Grazing Potential Assessment Report	Pasture cover species composition suited to beef cattle grazing, with trends in pasture health and composition comparable with non-mined grazing reference sites.	Agronomist	No	Yes	In progress.
		Monitoring Results	Soil assessment as part of site monitoring program indicates: Minimum topsoil depth 100 mm, with well-developed A horizon present. minimal evidence of active land degradation processes; no evidence of accelerated or concentrated erosion; Rootzone soil pH:4.5-9 Rootzone soil EC (1:5 ratio) of <0.15 uS/cm Rootzone soil cation exchange capacity (CEC) >14 Cmol+/kg Exchangeable sodium capacity (ESP) <5% Rootzone organic carbon levels (>4.0%) Rootzone soil phosphorous (Colwell P) levels 14-20 mg/kg	Blue Book Vol 2E, Hazelton & Murphy, Elliot & Veness, Grigg et al	No	Yes	In progress.
Post-mining landuses will be consistent with surrounding landuses, and not impact on	Land management measures implemented to control grazing related risks to onsite grazing,	Grazing Potential Assessment Report	Weed distribution comparable to reference sites.	2009 EA 2013 EA Agronomist	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
biodiversity values of adjacent woodland and conservation areas.	neighbouring land and adjacent biodiversity areas.	Fire Management Plan	Program implemented for fuel load assessment and reduction, with advice from NSW Rural Fire Service.	Bushfire Prevention Procedure	No	Yes	In progress.
		Monitoring Report	Pest animal infestation comparable to reference sites, with ongoing control program in place.	2009 EA 2013 EA	No	Yes	In progress
		Inspection Report	No gullies greater than 20cm depth over transects.	2009 EA 2013 EA	No	Yes	In progress.
		Monitoring Results	Monitoring of drainage lines indicates no significant concentrated/ accelerated erosion, and no downstream sedimentation or other degradation impacts.	2009 EA BMP 2013 EA	No	Yes	In progress.
Domain – D. Rehabilitation – Native Woodland							
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 maintained as established native woodland.	Rehabilitation Assessment Report Independent Report	All areas shown as Native Woodland vegetation community in Plan 4 have been established as open grassy woodland vegetation community. Verified by independent audit.	PA 09_0062 MOD 1	No	Yes	In progress.
	Rehabilitated native woodland will be focussed on establishing the vegetation communities as required in Project Approval.	Rehabilitation Assessment Report	Rehabilitated native woodland vegetation communities will include key species listed in Section 7.2 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	PA 09_0062 MOD 1 BMP/OMP	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
	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.	PA 09_0062 MOD 1 BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Density and diversity of developing tree and shrub species within rehabilitated community is comparable to that of reference sites.	BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Vegetation health indicators i.e. weed dominance, disease, water stress, premature die-back) comparable to that of reference sites.	BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area.	BMP/OMP	No	Yes	In progress.
		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.	BMP/OMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Fauna monitoring indicates patterns of native fauna colonisation and distribution comparable with non-mined native woodland reference sites.	PA 09_0062 MOD 1 BMP/OMP	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Rehabilitation Assessment Report	Overall weed trends comparable to reference sites.	2009 EA, MOP, BMP/OMP	No	Yes	In progress.
		Inspection Report	Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	2009 EA, MOP, BMP/OMP	No	N/A	In progress.
	Rehabilitated native woodland vegetation will provide faunal habitat and movement corridors by linking existing vegetation communities within and surrounding the mine boundary.	Rehabilitation Assessment Report	Rehabilitated native vegetation distribution will link areas of onsite and near-site native vegetation, and be consistent with the biodiversity corridors presented in the latest version of the DRG Synoptic Plan (or equivalent).	2009 EA, DRG Synoptic Plan	No	N/A	In progress.
	Soils/ growth medium displays physical and chemical properties suited to native woodland vegetation.	Field Monitoring	Field monitoring indicates: Topsoil minimum depth of 100 mm, with well-developed A horizon evident; no accelerated or concentrated erosion pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm Soil Carbon, Nitrogen and Phosphorous levels comparable with reference sites.	Blue Book Vol 2E, Hazelton & Murphy, Elliot & Veness, Rawling et al	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
The rehabilitated post-mining landscape will be compliant with relevant regulatory and corporate requirements.	The rehabilitated native woodland areas will be established and managed in accordance with the biodiversity and rehabilitation requirements of the EPBC approval, Project Approval and site Biodiversity Management Plan.	Audit Report	An independent audit of compliance with the biodiversity and rehabilitation requirements of the EPBC approval, Project Approval and site Biodiversity Management Plan will be undertaken within three years of planned mine closure, with all non-compliances addressed before final closure.	PA 09_0062 MOD 1 EPBC Approval	No	N/A	Not commenced.
Domain – E. Rehabilitation – Box Gum Woodland							
Rehabilitation areas will include at least 500 ha of re-established Box Gum Woodland.	A minimum area of 500 ha rehabilitation will be maintained as established Box Gum Woodland.	Rehabilitation Assessment Report	The 500 ha Box-Gum woodland area consists of the key species in the strata listed in Section 7.2 for Central Hunter Box - Ironbark Woodland or Central Hunter Ironbark - Spotted Gum – Grey Box Forest.	PA 09_0062 MOD 1 EPBC Approval	No	Yes	In progress.
	Rehabilitated Box Gum 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.	PA 09_0062 MOD 1 EPBC Approval BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Density and diversity of developing tree and shrub species within rehabilitated community is comparable to that of reference sites.	BMP	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Rehabilitation Assessment Report	Vegetation health indicators (i.e. weed dominance, disease, water stress, premature die-back) comparable to that of reference sites.	BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Observations indicating reproduction (seeding and flowering in second generation plants) recorded at multiple locations within rehabilitated vegetation area.	BMP	No	Yes	In progress.
		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.	BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Fauna monitoring indicates patterns of native fauna colonisation and distribution comparable with non-mined native woodland reference sites.	PA 09_0062 MOD 1 BMP	No	Yes	In progress.
		Rehabilitation Assessment Report	Overall weed trends comparable to reference sites.	2009 EA, BMP/OMP 2013 EA	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
		Rehabilitation Assessment Report	Weed density within Box Gum Woodland rehabilitation area is similar to that of State 1 areas as described in the Baseline Ecological Study of Mt Arthur Coal Biodiversity Offset and Conservation Areas (Umwelt, 2013).	BMP/OMP, Rawling et al	No	Yes	In progress.
		Inspection Report	Where adjacent to proposed grazing land, adequate fencing and signage is installed and maintained to prevent unintentional vehicle and livestock access.	2009 EA, MOP, BMP/OMP	No	N/A	In progress.
	Soils/ growth medium displays physical and chemical properties suited to native woodland vegetation.	Independent Field Monitoring Report	Field monitoring indicates: Topsoil minimum depth of 100 mm, with well-developed A horizon; no accelerated or concentrated erosion pH:4.5-9 EC (1:5 ratio) of <0.15 uS/cm Soil Carbon, Nitrogen and Phosphorous levels comparable with reference sites.	Blue Book Vol 2E, Hazelton & Murphy, Elliot & Veness, Rawling et al	No	Yes	In progress.

Objective	Performance Indicator	Performance Measure	Relinquishment Criteria	Justification / Source	Complete Yes/No	Link to TARP	Progress at Start of RMP
The rehabilitated post-mining landscape will be compliant with relevant regulatory and corporate requirements.	The rehabilitated native woodland areas will be established and managed in accordance with the biodiversity and rehabilitation requirements of the EPBC approval, Project Approval and site Biodiversity Management Plan.	Audit Report	An independent audit of compliance with the biodiversity and rehabilitation requirements of the EPBC approval, Project Approval and site Biodiversity Management Plan will be undertaken within three years of planned mine closure, with all non-compliances addressed before final closure.	PA 09_0062 MOD 1 EPBC	No	N/A	Not commenced
Domain – F. Onsite Conservation and Offset areas							
All onsite biodiversity offset and conservation areas will be managed to increase their biodiversity and habitat value, and meet regulatory requirements.	Rehabilitation operations are completed in accordance with the biodiversity and rehabilitation management requirements of PA 09_0062 and EPBC Approval 2011/5688, and the site Biodiversity Management Plan.	Audit Report	Compliance with management actions presented in the site Biodiversity Management Plan, as evidenced through the most recent Independent Environmental Audit and/or Biodiversity Audit.	PA 09_0062 MOD 1 EPBC BMP	No	N/A	Independent audits completed, but future audits required.

11 Research, Rehabilitation Trials and Use of Analogue Sites

11.1 Research

A final void investigation is underway, with the intent to better understand the options available to residual voids and the benefits that could be available to communities or the environment. The void investigation will be communicated to the Resources Regulator and the community. This work will complement the NSWMC void work that is currently underway.

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.

BHP in partnership with the Royal Botanical Garden Sydney (RBGS) are going to be working on a project associated with the RBGS Restore and Renew program. The Program will assist BHP to understand what the gaps are in Hunter Valley Woodland rehabilitation and to put together a comprehensive restoration manual that will be able to be used by BHP and others in NSW.

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 will have done the gap assessment for MAC by end of FY20.

A study will be commenced in in FY20 intended for creek diversions, reinstatement and realignments to:

  - incorporate erosion control measures based on vegetation and engineering;
  - incorporate structures for aquatic habitat (including geomorphic and vegetation); and
  - revegetate with suitable native species.
- As stated in the BMP HVEC 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.

11.2 Rehabilitation Trials

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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 forms part of an industry-wide rehabilitation grazing trial being coordinated by NSW Mining, as part of the Upper Hunter Mining Dialogue.

Mulch will be trialled as a temporary erosion control measure while in the ecosystem establishment phase.

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

Rehabilitation trials on VD1 will be done based on the recommendations from the Future Harvest Ecological Development Strategy and will include trials to address:

- Restricted vehicle access for undertaking works, maintenance and monitoring;
- Areas of invasive exotic perennial grasses and exotic woody weeds;
- Mid story and canopy tree species and densities;
- Feral animal browsing activity;
- Low levels of floristic diversity in the mid and ground cover layers; and
- Avian fauna roosting habitat or standing water availability.

11.3 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) sites are listed in appendix 4 of the REMP and shown below in Figure 13. Analogue sites may be added from time to time dependent on the mining and rehabilitation progression and access to relevant sites.

Pasture Assessment, using 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.

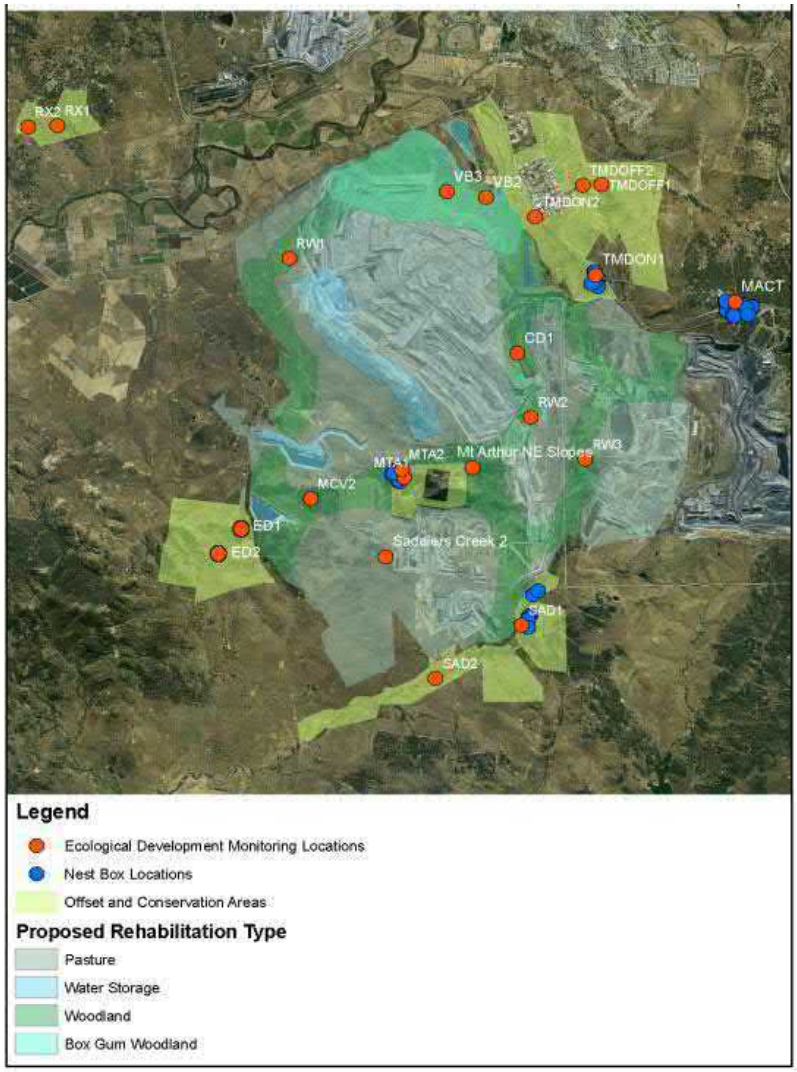

Figure 2: VCA and FS monitoring locations at the Mt Arthur Coal site and nearby offset areas

Figure 13. Extract of Monitoring locations from the REMP

12 Intervention and Adaptive Management

12.1 Threats to Rehabilitation

Section 7 discusses operational management of environmental risks specifically relating to rehabilitation. Building on the risks and issues discussed in Section 7, the major threats to the achievement of rehabilitation performance indicators and/or successful post-mining land use are summarised below. As discussed in Section 10, 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.

12.1.1 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.

12.1.2 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.

12.1.3 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.

12.1.4 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.

12.1.5 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.

12.2 Trigger Action Response Plan

A TARP (Table 13) 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.

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Table 13: 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				
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 HSE Superintendent Tactical Planning
Surface (wind or water) erosion leading to degradation of growth medium and rehabilitation/offset quality.	Monitoring programs: Landform Stability.	Trigger: Progress indicators: Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	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 HSE Superintendent Schedule Planning
Major geotechnical failure of overburden emplacement,	Monitoring programs: Landform Stability.	Trigger: Progress indicators: Landform Establishment.	Ensure emplacement reshaping minimises slopes >10° or incorporates appropriate drainage management.	Manager Production

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
such as slumping or subsidence.			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. Remedial earthworks and/or rehabilitation, as required.	Superintendent HSE Superintendent Schedule Planning Principal Geotechnical Engineer
Targeted land capability class not met by rehabilitated landform and soils.	Monitoring programs: Landform Stability; Grazing Potential.	Trigger: Progress indicators: Landform Establishment; Growth Medium Development.	Review landform design, rehabilitation planning and reshaping operational controls to identify root cause of incorrect land capability class establishment. 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.	Superintendent HSE Superintendent Schedule Planning
Failure of water management structures (or natural drainage lines), leading to erosion, unstable landform and potential pollution.	Monitoring programs: Landform Stability.	Trigger: Progress indicators: Landform Establishment; Growth Medium Development; Ecosystem/ land use Establishment.	Review landform design and reshaping operational controls to identify root cause of poor drainage performance. Develop remedial plan that repairs immediate failure and downstream impacts, improves up-catchment infiltration or drainage diversion.	Superintendent HSE Superintendent Schedule Planning
Sodicity and/or salinity of spoils/soils leading to accelerated erosion and	Monitoring processes/ programs: Materials geochemical assessment	Trigger: Progress indicators: Landform Establishment;	Conduct soil characterisation sampling and review current rehabilitation practices to identify root cause of erosion/dispersion.	Superintendent HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
preventing successful vegetation establishment.	during project planning. Landform Stability.	Growth Medium Development.	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.	
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 Survey Superintendent
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.	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.	Principal Geotechnical Engineer

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
Biological Factors				
Insufficient, poor quality or incorrect species seed/seedlings leading to poor vegetation establishment.	Monitoring programs: Ecological Development; Grazing Potential.	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 HSE
Poor vegetation development leading to simplified, non-stratified community structure of poor habitat value.	Monitoring programs: Ecological Development.	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) 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.	Superintendent HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
Inadequate weed control, leading to extreme weed competition preventing establishment of desired species.	Monitoring programs: Landform Stability; Ecological Development; Grazing Potential.	Trigger: Progress indicators: Growth Medium Development, Ecosystem/Land use Establishment; Ecosystem/Land use Sustainability.	Implement remedial treatment program to control weeds (i.e. chemical weed control, encourage rapid establishment of ground cover, scalping of surface layer, topdressing). 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.	Superintendent HSE
Continued dominance of exotic tropical grass species, preventing successful establishment of native grass groundcover.	Monitoring programs: Ecological Development.	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). 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. Ensure intensified monitoring during re-establishment of remedially treated rehabilitation, and review ongoing monitoring/ maintenance regime to ensure adequate.	Superintendent HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
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. Increasing presence of feral animals.	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. Consult with neighbouring/ district landowners to coordinate control programs.	Superintendent HSE
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.	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). 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.	Superintendent HSE
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 HSE

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				
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 HSE
Major storm event resulting in flooding, geotechnical instability, major erosion	Monitoring programs: Landform Stability; Ecological Development.	Trigger: Progress indicators: Growth Medium	Review landform planning and design, and rehabilitation practices, to identify root cause of poor drainage/ rehabilitation performance.	Superintendent HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
and/or widespread damage to rehabilitation areas.		Development, 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 Schedule Planning
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 HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
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; Ecosystem/Land use Sustainability.	Attempts should be made, within the capabilities of site resources and the RFS, to prevent uncontrolled fires reaching newly rehabilitated areas. 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.	Superintendent HSE
Pollution Issues				
Release of leachate/ contaminants from mined materials/ waste material requiring long-term management or treatment.	Monitoring programs: Landform Stability Monitoring programs: Water monitoring/ modelling.	Trigger: Progress indicators: Decommissioning; Landform Establishment. Trigger: discharge/ seepage from emplacements exceeds EPL/ Water Management Plan water quality criteria.	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. 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.	Superintendent HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
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 HSE
	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.	
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. Trigger: project specific contamination investigation criteria exceeded, or asbestos in path of proposed disturbance.	Works to be halted or relocated, and site appropriately isolated until declared safe for human access. 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.	Superintendent HSE Superintendent Health & Hygiene

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
Management and Organisational Factors				
Inadequate resources lodged/ provisioned to successfully rehabilitate mine areas a closure.	Monitoring processes: RCE calculations and progress indicators Rehabilitation provisioning	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. Investigate opportunities for accelerated decommissioning and rehabilitation while mine still operating. Review Mine Closure Plan to identify opportunities for streamlining the closure process, while still meeting Relinquishment criteria	Superintendent HSE Manager Strategic Planning Manager Closure Planning
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 HSE
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. Make submissions to incompatible development applications in proximity of site rehabilitated areas. Continue to regularly consult with stakeholders to gain acceptance of completion criteria.	Superintendent HSE Manager Environment Analysis and Improvement
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 HSE

Risk and Level for Response	Monitoring & Measurement Process	Trigger	Proposed Response Action and Mitigation Measures	Responsible Person
		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.	

13 Review and Implementation of the RMP

13.1 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
- 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.

13.2 Implementation

Table 14: Responsibilities for implementation of this RMP

Title	Responsibility
Statutory Mine Manager	Provide resources required to undertake mine and rehabilitation planning, and implement RMP commitments. Internally approve RMP
Manager Production Planning/ Manager Closure planning	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 AEMR.
Head of Health Safety and Environment	Supervise the preparation of the RMP. Implement, monitor and review the programs and commitments contained in this RMP and supporting procedures. Consult with regulatory authorities as required. Provide for the engagement of external assistance as required. Report the progress of mine disturbance, rehabilitation and monitoring in the AEMR.
Superintendent HSE Business Partnership	Provide support for the implementation Health Safety and Environment responsibilities. Assist in RMP preparation
Chief 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 Control Authorisation

Business Process Owner Endorser Authorisation			
Position	**Name**	**Date**	**Signature**
Superintendent HSE Business Partnership	Kris Sheehan	10/7/19	
Superintendent Tactical Planning	Rob Pascoe	10/07/19	
Manager Production Planning	Damien Perkins	04-07-2019	

Approver Authorisation			
Position	**Name**	**Date**	**Signature**
General Manager	Dawid Boshoff	4/7/19	

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.

Appendix 2: References

Rehabilitation Table 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.
Andrews, N (1999)	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.
BHP 2017	BHP Coal Landform Design Guideline (August 2017)
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	Site 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.

Appendix 3: NSW Resources Regulator GIS Portal Output

The output PDF will be added after submission to the GIS portal.

Appendix 4: Consultation Correspondence

Correspondence will be added when completed and made available in this document on the BHP website.

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6 June 2019

Mt Arthur Coal
Community Consultative Committee

Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear CCC,

Hunter Valley Energy Coal Pty Ltd (HVEC) will be submitting an amendment of the Mine Operations Plan (MOP) for the Period FY20 – FY22 (July 2019 – June 2022) to the Resources Regulator. The MOP similarly satisfies the requirement of Condition 44 of the Project Approval No. 09_0062 (as modified on 26 September 2014) (Project Approval) for a Rehabilitation Management Plan. We are pleased to provide the amended MOP and associated plans to maintain communication and updates regarding mining activities at Mt Arthur Coal.

The format of the MOP has been updated to align with the draft Rehabilitation Guidelines released by the NSW Resources Regulator. This means there are now two main sections for this MOP submission. Section 1 aligns to the Guidelines for Code of Practice Annual Rehabilitation Report and Forward Program for Large Mines. Section 2 aligns to the Code of Practice: Rehabilitation Management Plan for Large Mines.

The MOP amendment documentation includes:

- Mt Arthur Coal Annual Forward Program FY20, FY21 & FY22;
- Mt Arthur Coal Rehabilitation Management Plan (five year duration).

Rehabilitation Management Plan Amendment Scope
The RMP format has been modified to align with the Code of Practice: Rehabilitation Management Plan. The content of the RMP is largely unchanged other than additional information in Sections 9 and 10 for quality control and monitoring respectively and Section 11 for Rehabilitation research and trials. The RMP duration is for a five year period. The RMP is not expected to change much over time but will require updates from time to time with changes to rehabilitation processes.

Annual Forward Program Amendment Scope
The Annual Forward Program (AFP) disturbance is located within the Mt Arthur Coal Project Approval Project 09_0062 MOD 1 (Project Approval) extent of approved surface development (Ancillary Disturbance Boundary) Furthermore, the AFP is aligned with the Conditions and Environmental Assessment of the Project Approval.

The changes proposed for the AFP have arisen due to identification of opportunities for increasing the efficiency of current operations. The opportunity assessment is undertaken on an annual basis and recent assessment has identified areas for rehabilitation, overburden and mining not currently in the FY18-FY20 MOP. These options were already considered as identified within the Project Approval, and have been assessed for community and environmental aspects.

Rehabilitation progression
MAC dig and dump has been constrained at the northern end of the mine. As a result this has slowed the advancement of the northern emplacement and pushed mining intensity to the southern areas of the main pit. Over the past two years, MAC has been through a comprehensive opportunity assessment to determine the most effective plan for rehabilitation and mining to deal with this constraint. The most recent inclusion is the main pit realignment to reduce the obtuse angle between the endwall (north) and advancing highwall to transition back to 90 degrees. By doing this, the northern emplacement adjacent to Denman Road will be accelerated and rehabilitation will be released more consistently across the years.
The eastern and southern areas of the main emplacement are not available for rehabilitation consistently in the near term due to the size and height of the final dump and the time to take to reach its outer limits.

The tailings dam is also a hard constraint on the eastern perimeter of the mine. Additionally, the two south west out of pit emplacements are being placed in a way that will maximise rehabilitation and minimise the amount of time an open face would be visible from off the mine site (south west direction). Temporary stabilisation activities proposed for this AFP period 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. Approximately 600 ha of aerial seeding is proposed during the three year AFP period for temporary stabilisation.
Discussion is encouraged on all aspects of rehabilitation in the MOP (AFP and RMP).

Management Plans
No updates will be required to any other management plans, as no significant additional changes are expected to result from the proposed updates. HVEC will also be discussing the amendment with other stakeholders before submission to the NSW Resources Regulator.

Please reply in writing to this letter by 24 June 2019 with any questions or comments regarding the specified MOP amendment, so that we can appropriately address these, and that we can provide correspondence to the NSW Resources Regulator along with the MOP submission.

Please do not hesitate to contact me on 0429186152 or at luke.l.neil@bhp.com.

Regards,

Luke Neil
Principal Environment Analysis and Improvement
BHP Minerals Australia

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12 July 2019

Mt Arthur Coal
Community Consultative Committee

Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear John Bancroft,

Hunter Valley Energy Coal Pty Ltd (HVEC) will be submitting an amendment of the Mine Operations Plan (MOP) for the Period FY20 – FY22 (July 2019 – June 2022) to the Resources Regulator. The MOP similarly satisfies the requirement of Condition 44 of the Project Approval No. 09_0062 (as modified on 26 September 2014) (Project Approval) for a Rehabilitation Management Plan.

We are pleased to provide the following response to your comments below (provided in blue/grey text and preceded by "HVEC Response").

MAC Mining Rehabilitation Management Plan

The voids

You state that post mining the landscape will be safe, stable and non-polluting not causing harmful impact on downstream water.

This Report does not state:

- The total area of the void –

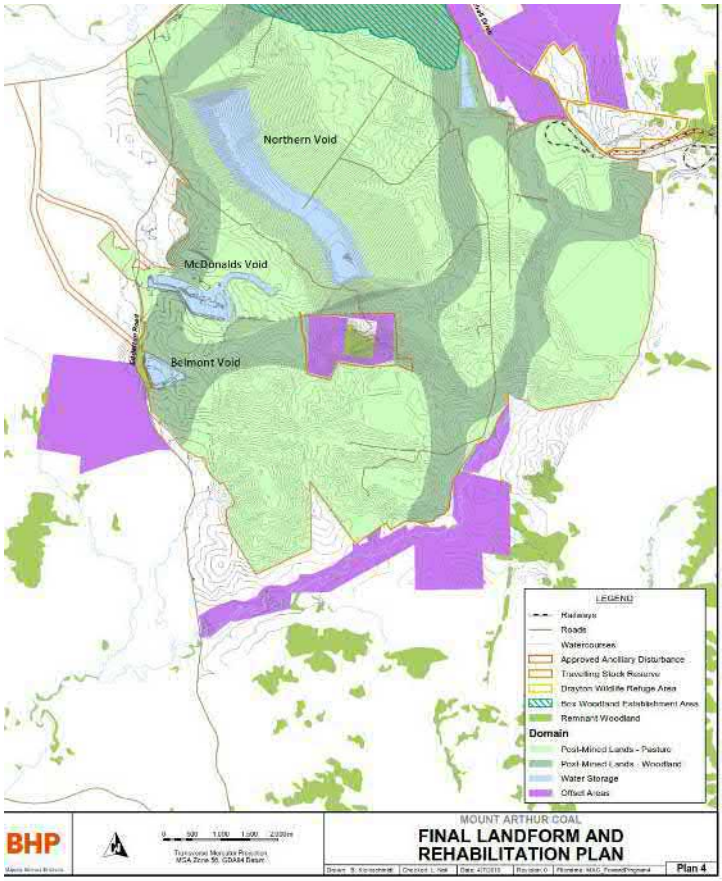
HVEC Response - The approved final voids have the following approximate dimensions:
Northern Void, surface area 730ha and 281m below ground level
  - Belmont void, 40ha and 28m below ground level
  - McDonald void, 32ha and 57m below ground level

- The number of voids –

HVEC Response - The Project Approval (No. 09_0062) approves three final voids: Northern, McDonalds and Belmont voids.

- The depth and exact location of each void -

HVEC Response - The approximate location of the approved final voids are shown on page 33 of the Rehabilitation Management Plan, Figure 5 – Final Landform and Rehabilitation Plan. HVEC will label these within Figure 5 of the RMP and add the dimensions provided above into the text. Locations are shown below for your immediate reference.



12.1 Threats to Rehabilitation

Page 94

12.1.4

- Unsatisfactory water quality of the final void water leading to environmental impacts, and failed post - mining use

12 1.5

- Poor systems implementation leading to inadequate rehabilitation monitoring and maintenance
- Inadequate resources lodged/ provisioned to successfully rehabilitate the mine area at closure
- Evolving regulatory requirements conflicting community expectations and district land use leading to difficulties negotiating or attaining relinquishment criteria for older rehabilitation

Community Concerns

If MAC is concerned about adequate resources to successfully rehabilitate the mine on closure I ask:

HVEC Response – This section is used to show that HVEC has considered what risks could exist so that controls can be put in place to manage those risks. It is not a section describing what risk events have occurred or will occur.

1. What has MAC budgeted for the approximate cost of mine closure?
   HVEC Response - The current Rehabilitation Security Bond held for Mine closure with the Department of Planning and Environment. The Rehabilitation Security Bond process managed by DPE is designed and regulated to provide assurance that rehabilitation and closure will be completed as required by the State.

2. If the mine is sold to another party, would that sale be conditional upon that company being responsible for rehabilitation as per MAC 's approval?
   HVEC Response – Yes in most circumstances unless HVEC develop an agreement to do otherwise.
3. How does the community ensure that future owners have sufficient funds to complete the closure?
   HVEC Response – The Rehabilitation Cost Estimate Process (rehabilitation security bond) is managed by DPE and requires the proponent to have funds for closure at all times. More information on the process can be found on the DPE Resource Regulator website.
4. Further information is required regarding the depth and contamination of water accumulated in the voids.
   HVEC Response – Depth of the void is provided above. Pollution of water is always a consideration and HVEC's goal is to have final voids that minimise impacts to surface water and groundwater beyond the void itself. Northern void will behave as a groundwater sink, with long-term water levels between 130 m to 150 m below the pit crest. The Permian coal measures are the main source of groundwater to the Northern void (AGE, 2012). Contributions of salts from groundwater, leaching of spoil, evaporation causing concentration, will all result in water of limited value for consumption of people, livestock, wildlife or for agricultural purposes. The interaction with groundwater will be examined further.
5. What assurances, will MAC give this community that, rather than close the mine, they will not just put the mine into care and maintenance, as they have done with the underground project, to avoid the closure costs?
   HVEC Response – This is a HVEC management decision and care and maintenance would have to be agreed to by DPE.

11.1 Research

A void investigation will be developed and completed in this MOP period. The intent is to better understand the options available to residual voids and the benefits that could be available to the communities or environment. The void investigation will be communicated to the Resources Regulator. This work will complement the NSWMC void work that is currently underway.

The community has an expectation that rehabilitation means the voids will be filled to a level pre-mining taking place, as depicted in the current adds running on TV by the Minerals Council of Australia.

HVEC Response - MAC's Project Approval approves three final voids: Northern, McDonalds and Belmont voids. The current final landform design leaves 3 final voids at the end of mine life. Two of these will be used as water storages and one will be a groundwater sink. As stated above further work is being conducted on other options.

If investigation comes up with uses for the voids then the community would expect that it is realistic and feasible. MAC would be expected to make that use viable and meet the cost for that use. For example, as previously stated, use as a garbage dump. MAC would be expected to make the void suitable for that use.

HVEC Response - The void study will provide at a minimum a high level assessment on viability of alternate uses. However all uses will be subject to either the community, government or private investors or industry to agree on an alternate use and to then actually develop this use. It is not necessarily the responsibility of BHP alone to create an alternate use or make the void suitable for that use.

Please do not hesitate to contact me on 0429186152 or at luke.l.neil@bhp.com.

Regards,
Luke Neil
Principal Environment Analysis and Improvement
BHP Minerals Australia

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6 June 2019

Fiona Plesman
General Manager
Muswellbrook Shire Council
PO Box 122
Muswellbrook
NSW 2333

Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear Fiona,

Hunter Valley Energy Coal Pty Ltd (HVEC) will be submitting an amendment of the Mine Operations Plan (MOP) for the Period FY20 – FY22 (July 2019 – June 2022) to the Resources Regulator. The MOP similarly satisfies the requirement of Condition 44 of the Project Approval No. 09_0062 (as modified on 26 September 2014) (Project Approval) for a Rehabilitation Management Plan. We are pleased to provide the amended MOP and associated plans to maintain communication and updates regarding mining activities at Mt Arthur Coal.

The format of the MOP has been updated to align with the draft Rehabilitation Guidelines released by the NSW Resources Regulator. This means there are now two main sections for this MOP submission. Section 1 aligns to the Guidelines for Code of Practice Annual Rehabilitation Report and Forward Program for Large Mines. Section 2 aligns to the Code of Practice: Rehabilitation Management Plan for Large Mines.

The MOP amendment documentation includes:

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- Mt Arthur Coal Rehabilitation Management Plan (five year duration).

Rehabilitation Management Plan Amendment Scope
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Rehabilitation progression
MAC dig and dump is constrained at the northern end of the mine. As a result this has slowed the advancement of the northern emplacement and pushed mining intensity to the southern areas of the main pit. Over the past two years, MAC has been through a comprehensive opportunity assessment to determine the most effective plan for rehabilitation and mining to deal with this constraint. The most recent inclusion is the main pit realignment to reduce the obtuse angle between the endwall (north) and advancing highwall to transition back to 90 degrees. By doing this, the northern emplacement

adjacent to Denman Road will be accelerated and rehabilitation will be released more consistently across the years.
The eastern and southern areas of the main emplacement are not available for rehabilitation consistently in the near term due to the size and height of the final dump and the time to take to reach its outer limits. The tailings dam is also a hard constraint on the eastern perimeter of the mine. Additionally, the two south west out of pit emplacements are being placed in a way that will maximise rehabilitation and minimise the amount of time an open face would be visible from off the mine site (south west direction).
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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. Approximately 600 ha of aerial seeding is proposed during the three year AFP period for temporary stabilisation.
Discussion is encouraged on all aspects of rehabilitation in the MOP (AFP and RMP).

Management Plans
No updates will be required to any other management plans, as no significant additional changes are expected to result from the proposed updates. HVEC will also be discussing the amendment with other stakeholders before submission to the NSW Resources Regulator.

Please reply in writing to this letter by 24 June 2019 with any questions or comments regarding the specified MOP amendment, so that we can appropriately address these, and that we can provide correspondence to the NSW Resources Regulator along with the MOP submission.

Please do not hesitate to contact me on 0429186152 or at luke.l.neil@bhp.com.

Regards,

Luke Neil
Principal Environment Analysis and Improvement
BHP Minerals Australia

muswellbrook shire council

Enquiries
Please ask for Sharon Pope
Direct 02 6549 3868
Our ref
Your ref

20 June 2019

Principal – Environmental Analysis and Improvement
BHP Minerals Australia
Luke.I.neil@bhp.com

Dear Mr Neil,

Re: Feedback on the draft Mount Arthur Mine Rehabilitation Annual Forward Program and Mine Rehabilitation Management Plan

Thank you for providing Council with a copy of the draft Mine Rehabilitation Annual Forward Program and Rehabilitation Management Plan on 6 June 2019. The Mine Rehabilitation Annual Forward Program is for the period 1 July 2019 to 30 June 2022.

We note that your covering letter states that "The RMP is not expected to change much over time but will require updates from time to time with changes to rehabilitation processes." This statement is disappointing as it discounts input from stakeholders and recognition of their concerns to elements of the DMP.

Similarly, "no updates will be required to any other management plans, as no significant additional changes are expected to result from the proposed updates." Implies that already depauperate planning documents such as the *Void Management Plan*, will not be developed further in the short term as they need be.

Council staff have reviewed the documents. The following comments are provided:

Mt Arthur Coal: Rehabilitation Management Plan Version 3.0, dated 5 June 2019.

1. Council joins in its previous submissions regarding the Rehabilitation Strategy referred to in the RMP. To the extent that the RMP is based on the purported Rehabilitation Strategy, which Council maintains is deficient in fundamental respects, the RMP in Council's submission cannot meet the requirements of condition 44 of the Modified Project Approval.

Future Landscapes Design Project (p. 7)

2. The RMP states that there was a project undertaken to research a landform approach that would align with community expectations and improvements in landform design techniques. The report cites a report by Landloch Pty Ltd (2014) capturing project findings now incorporated into the Applied Geofluvial landform.
    - Is a copy of this report available for Muswellbrook Shire Council's viewing?

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- Can BHP demonstrate how findings have been incorporated, both generally and specifically?

Applied Geofluvial Approach (p. 7)

3. The RMP notes that the Applied Geofluvial 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 the design.
    - How have Landloch concerns about the inappropriateness of an erosion modelling technique that requires an assumption of alluvially-formed analogue sites been addressed (Bugosh, 2008; Howard et al., 2011)?
    - How has management of erosion been planned for:
        - The pit lake catchment; and
        - The constructed waterways

Pre-Mining Environment - Natural Environment Plan 1B (p. 14)

4. Pre-Mining Environment - Natural Environment Plan 1B (p. 14) - 1:100 year flood events are not appropriate for closure planning and more extreme storm events should be considered in closure planning (APEC, 2018). Indeed, 1:100 annual return interval (ARI) events, are typically used for operational mining states. Leading rehabilitation practice and "minimising to the greatest extent practicable the risk of flood interaction in respect of the final voids" closure planning requires "a considerably longer return interval (such as probable maximum flood, or PMF)" and resulting lower risk of flood events than this 1% ARI (DIIS, 2016e).
    - What are local waterway flood levels appropriate to closure planning for more extreme events e.g., Probable Maximum Flood (PMF)?
    - Are the blue polygons pit lakes? What water level does the polygon area indicate and why this level? Why are pit lakes not included in the figure legend?
    - What is the risk of:
        - river inflow to the pit lakes; and,
        - decant from pit lakes?
    - What do Roman numerals on Plan 1B indicate? Why are they not in a legend? Why are pit lakes designated with land capabilities?

Regulatory Requirements related to rehabilitation (Table 2)

5. The RMP states that this strategy must...

    (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...

- How were options investigated for increasing woodland rehabilitation area and decreasing final void size? What was the outcomes to both investigations?
- How has beneficial end use of disturbed areas been investigated? In particular; how has end use of voids been investigated; both the risk (drowning, pollution) and opportunity?
- What are the "detailed rehabilitation objectives" for final voids? How were these determined? What are their associated closure criteria?"

6. The RMP notes that performance and completion criteria will be used for evaluating the performance of the rehabilitation of the site, and triggering remedial action may be necessary).

   - What performance and completion criteria have been established for:
     - long term erosion;
     - final pit voids (dry and as lakes); and,
     - waterways (Constructed and receiving)?

7. The RMP states the requirement to 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. Measures for compliance for voids, in particular, are still not available.

   - What measures are proposed to ensure compliance with overall long-term erosion, voids, and waterways as above?

8. The RMP requires the inclusion of a research program that seeks to improve the understanding and application of rehabilitation techniques and methods in the Hunter Valley.

   - How has, or will research specifically address overall long-term erosion, voids, and waterways as above?

9. *The RMP states a requirement to include a program to monitor, independently audit and report on the effectiveness of the measures, and progress against the detailed performance and completion criteria. Monitoring and auditing appear to be largely limited to revegetation.*

   - How has, or will monitoring and independent auditing be conducted to specifically address overall long-term erosion, voids, and waterways as above?

10. The RMP states that it complies with the new RMP for large Mines guidelines from the Resource Regulator (previously DRE).

    - Is this view achieved in the view of the Resource Regulator?

11. EPBC Approval 2011/5688, Condition 4 - The RMP notes that action must commence for progressive regeneration of 1915 ha of woodland and forest communities, including 299.20 ha of Box Gum Woodland within 1 year of commencement of construction.

    - Has regeneration of all of this vegetation been undertaken to this schedule?

12. Mining Tenement ML1358 - 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.

    - How are/will voids being treated to ensure slope stability (geotechnical and erosion) and to make steep sides and drowning hazards for stock and humans safe?

    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.*

    - How is runoff from disturbed areas, both operationally and rehabilitated, be managed to prevent erosion?
    - What monitoring data supports that this management is effective?

13. Mining Tenement ML1487- 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 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.*

    - How is waterway water quality monitored and appropriately managed for all contaminants of potential concern (COPC) elevated due to mining activity?
    - How is waterway habitat monitored and managed to mitigate mining impacts on aquatic biota habitat; both of vertebrates and lower orders of aquatic food webs?

14. Mining Tenement ML1548 - 13 (a). *The land does not pose a threat to public safety.*

    - How is or will public safety be managed for;
        - deep erosion;

- steep cliffs and highwalls; and,
- void sides and depth?.

15. Mining Tenement CCL 744 - 7. Disturbed land must be rehabilitated to a sustainable/agreed end use to the satisfaction of the Director-General. End land use is only clear for some areas of the project. Many areas, especially those heavily modified e.g., voids, demonstrated no end use planning effort.
    - What are the end uses for all project area domains?
    - How are these end uses demonstrably agreed/sustainable?

Final Land Use Statement

16. 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.
    - Water management is an oblique activity and not an end use (McCullough; Schultze; et al., 2018). What is the end use of the proposed pit lakes?

Stakeholder Consultation

17. Stakeholder Consultation - Further study of the Geomorphological design will continue to meet stability, land use, safety and cost requirements.
    - What are the specific requirements for each of these items (stability, land use, safety and cost)?

Asset Register

18. Open Cut Voids (active mining). Rehabilitation works (hardstands/roads/tracks, high-wall and low-wall treatment, topsoiling and revegetation).
    - What are the rehabilitation "treatments" and revegetation plans for voids? How have these been determined? And what is their purpose (to what objectives and criteria)?
19. Water Management Areas. Whites Creek diversion partially retained and integrated into post-mine landscape. Redundant section reinstated and rehabilitated.
    - How will creek lines be rehabilitated to maintain water quality and aquatic habitat? How will this be measured? And to what objectives and criteria?
20. Existing Rehabilitation. Ongoing monitoring, maintenance and (where required) remedial activities.
    - What remedial activities have been required in the past and/or is expected in the future? How has remediation occurred/is planned to occur?
21. Tailings Storage Facility. A detailed tailings dam dewatering and capping methodology will be developed.
    - When?
    - To what standards or guidance?

22. 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.
    - Given the specificity of this thickness, why this thickness?
    - What is the purpose(s) of the cap? What sort of material?

23. Overburden emplacements. Remaining sediment dams integrated into surrounding catchment and drainage lines.
    - How will water bodies in previously rehabilitated areas be integrated into drainage lines?
    - What is the purpose and nature of these drainage lines?
24. Conservation Areas. Remaining dams will be decontaminated and converted to clean water structures.
    - Why?
    - What contaminants are expected?
    - What is the purpose (objectives and associated criteria) of these structures i.e., what is the water supply for?

Rehabilitation objectives and completion criteria

25. Rehabilitation objectives and completion criteria
    - The terms 'objectives' and 'criteria' seem to be used interchangeably suggesting some confusion as to the separate purpose of each?
    - How does the use of these terms fit with BHP corporate closure standard definitions?

26. *Each progress benchmark is selected from, or supported by, relevant and authoritative sources.*
    - Can these sources be made available and linked to the specific development of each criterion?
    - In particular, what leading industry guidelines have directed Mt Arthur closure planning; and how?

27. Table 5 purports to set out "*Domain Specific Rehabilitation Objectives and Criteria*". Both the completion criteria and performance/leading indicators are insufficient and not defined at a level of specificity which indicates how they are to be measured let alone met by the miner.
    - What performance and completion criteria have been established for:
        - long term erosion;
        - final pit voids (dry and as lakes); and,
        - waterways (Constructed and receiving)?

Domain Specific Rehabilitation Objectives and Criteria

28. Completion Criteria (as a whole)
    - Few of these completion criteria are, in actual criteria e.g., Closure criteria and proposed final land use developed through stakeholder consultation. Instead, they are narrative around the actual criteria; which are left undefined and leave the reader with no concept as to what closure vision is proposed.
29. Landforms are independently assessed as safe and stable compatible with surrounding natural landscape.
    - By whom?
    - What discipline and qualifications?
    - How compatible?
    - What if they are not? what redress is expected?
30. Restoration of mined land achieves visual amenity.
    - Of whom? How measured?
31. TSF capped to ensure long-term containment of emplaced material and sustains proposed land use.
    - What about chemical stability of emplaced material?
    - What is this end use?
32. Safe, stable and non-polluting final landforms.
    - Historical already rehabilitated landforms have not primarily designed with fluvial geomorphological processes in mind often start to erode in heavy rainstorms with water running off the sites becoming turbid and impacting the quality of the water in local rivers and streams (Eckels & Bugosh, 2010). Some of the most damaging pollution from mine sites occurs when potentially acid forming (PAF) materials in waste landforms are contacted by water leading to acidic and metalliferous drainage (AMD) (DIIS, 2016e). Stable waste landforms provide geochemical and geotechnical stability that resist long□term erosion and degradation of cover systems (Kemp et al., 2016). As construction of the historic landforms does not appear to have accounted for erosive fluvial geomorphological processes, it suggests that erosion of these landforms is likely to be elevated above that of natural landforms (McCullough, 2016) and that this will likely beget difficulties with the mine's ability to meet closure criteria of safety and being non-polluting.

Agricultural land

33. Agricultural land - *Revegetation has facilitated fauna recolonisation and landscape function.*
    - To what degree? How is it known when this is achieved?

34. *Plant communities are creating effective habitat linkages and are aligned to surrounding native vegetated lands.*
    - Habitat linkages for what? "Aligned" to what? How is it known when this is achieved?

35. *Return appropriate areas of land to sustainable grazing use.*
    - A key outcome of a failure to rehabilitate final landforms in a manner that prevents excessive and/or ongoing erosion is also that key next land uses, such as grazing, may not be viable. For example, if deep gullying threatens livestock welfare when grazing has been proposed as a final landform land use (Lamb et al., 2015).

36. Table 5 should reference installation of infrastructure required to enable a viable grazing operation post rehabilitation (some infrastructure is identified separately on p55).

Final Voids

37. Designed as long term groundwater sinks and to maximise groundwater flows across back-filled pits to the final void. As with flood risk; whether or not a pit void lake has been designed as a long-term groundwater sink requires a similar water balance modelling approach as does flood interaction risk (McCullough; Marchand; et al., 2013).
    - Has water balance modelling been undertaken for all final voids?
    - What were the findings and assumptions (McCullough; Marchand; et al., 2013)?
    - How have groundwater flows been maximised?

38. Minimise to the greatest extent practicable: the size and depth of final voids the drainage catchment of final voids.
    - How has this minimisation been undertaken; what were the drivers?
    - What were the key objectives?

39. Any high wall instability risk.
    - How has stability risk (geotechnical and erosional) been investigated?
    - What were the findings and assumptions?

40. Risk of flood interaction. The actual frequency of the risk of pit lake decant under flooding is undefined in the RMP. Any information as to how the actual objective of "minimising to the greatest extent practicable the risk of flood interaction" will be achieved is not presented in the RMP. However, as part of industry practice rehabilitation of a pit void lake the pit lake water balance would be expected to be modelled, the risk quantified and any necessary management proposed, (McCullough et al., 2012; McCullough; Ballot; et al., 2013; McCullough & Harkin, 2015; McCullough & Schultze, 2015; Vandenberg & McCullough, 2017).

- Has water balance modelling been undertaken for interaction of all final voids with closure scale events e.g., probable maximum flood (PMF) (APEC, 2018)?
- What were the findings and assumptions?

41. Final voids assessed by a qualified geotechnical engineer for stability and do not pose a safety risk.
    - How is "safety risk" defined?
    - What detail as to safety will be incorporated e.g., safety factors?
    - What management will be undertaken to manage all void safety risks (Ross & McCullough, 2011):
        - falls; and,
        - drownings (Hatch, 2007)?
    - Of concern, the Rehabilitation Strategy statement that final voids will "not pose a safety risk" is naïve: a safety risk is always present; the purpose of detailed rehabilitation planning is to determine what this risk is (through explicitly ascertaining factors of likelihood and consequence) (Ross & McCullough, 2011; DIIS, 2016f). A problem here is the still undefined final void use which fails to define human interaction and therefore risk.
    - No comment or plan is given to how the safety aspect of human and stock drowning will be made safe. For instance, in steep beach areas. Furthermore, the eastern highwall of the Northern Open Cut final void does not present level ground upon which to be able to safely and reliably place exclusion measures such as an abandonment bund (DoIR, 1997).
42. Void use is compatible with long-term void relinquishment options. Repurposing of pit voids requires considered planning (McCullough; Schultze; et al., 2018)
    - What are these long-term void relinquishment options?
    - How is compatibility demonstrated?
    - How has the particular rehabilitation needs of revegetating closure to the pit lake edge (riparian, littoral) been considered (Van Etten, 2011)?
43. Leading practice closure of pit voids is for water quality risk to be understood and managed to acceptable levels (CEMA, 2012; DMP & EPA, 2015; DIIS, 2016d; Vandenberg & McCullough, 2017; APEC, 2018).
    - What will the long term water quality be?
    - Will this water quality present any risk to either humans, stock or wildlife?
    - How will this risk be managed?
44. No long term groundwater impact to downstream users.
    - How has this been demonstrated?
45. Final voids are consistent with achievable key stakeholder agreed social and environmental values

- What are the objectives and criteria for these? What process defined them?

Creek diversions and realignments

46. Decommissioned mine water management facilities rehabilitated to stable and non-eroding landforms and/ or watercourses. Leading rehabilitation practice is for channel diversions to be modelled prior to construction to ensure geomorphological stability (in much the same way for other final landforms, such as emplacements) (Sylkarski et al., 2016). However, this leading practice detail does not appear to be proposed in the RMP.
    - Why is stable and non-eroding desirable?
    - Is stable and non-eroding achievable?
    - How will stable and non-eroding specifically be achieved (Tip: more than hydrological assessments are required)?
    - How will monitoring demonstrate achievement of stable and non-eroding?
    - What sort of ecosystem is desired?
47. Rehabilitated water management features will be re-instated and managed as stable, non-eroding and non-polluting landform features.
    - This 'detail' merely paraphrases the oft repeated broad aim for "stable, non-eroding and non-polluting landforms" and moreover states that landforms will "...not be eroding". Landforms should all be eroding; erosion is impossible to prevent. Instead, rehabilitation leading practice (including that of the GeoFluv approach) focusses on rates of erosion commensurate with that of analogue surround landforms.
48. Revegetate with suitable native species.
    - Without detail it remains unclear as to how creek diversions will be rehabilitated; including as to exactly what native species will be used in the rehabilitation.
    - No plans for habitat enhancement as an objective of rehabilitated creek diversions is indicated by the RMP. The RMP gives no indication of how, or even if, revegetation with native species will occur. Instead, creek diversions are treated largely as drains, with engineered designs to facilitate unimpeded water passage alone.

Surface infrastructure

49. *To be decommissioned and removed, unless agrees otherwise DRE.*
    - This statement has typos
50. Plan 4 (p.33) includes markings referring to "Edderton Road Realignment Options". Now a final route has been selected only that route should be shown.

Community

51. *Sustainability and diversity demonstrated by assessment of vegetation type, land use type and suitability to final landform*

- 'Assessment' is a method and not a criterion.

52. *Ongoing management requirements no greater than adjacent non-mined land*
    - How is 'greater' defined?
53. *Post-mining land use is compatible with surrounding land use in terms of optimal social and economic benefit (local and wider community)*
    - 'Optimal social and economic benefit' is a very strong statement; how is 'optimal' defined and how will it be measured?
54. *Minimise the adverse socio-economic effects associated with mine closure.*
    - Local communities are typically highly dependent on nearby mines for socio-economic benefit which is then abruptly withdrawn following mine closure (Lienhoop & Messner, 2012). The impact of closure on local and even regional socio-economics can therefore be significant and should be a key consideration in closure planning processes and documents (Nelson & Scoble, 2005; DIIS, 2016a; APEC, 2018).
    - The Offset Area adjoining Thomas Mitchell Drive may actually be best suited to industrial uses, making use of public infrastructure, and allowing additional employment generating activities.

Stakeholder Consultation

55. *Mt Arthur Coal regularly engages with local stakeholders regarding proposed operations, potential impacts and management, and community engagement programs and opportunities.*
    - What are key community concerns about:
        - Operations; and
        - closure?
    - How are these concerns specifically addressed in the RMP?
56. *The FLDP was an initiative to investigate, develop and deliver an integrated landform that is compatible with the surrounding natural landscape.*
    - How does pre-existing rehabilitation differ from the FDLP in this way?

Final Landform and Rehabilitation Plan

57. *Figure 4 in the RMP shows topographic gradients that will lead to water flow direction from the older waste landforms toward receiving systems of regional streams and creeks.*
    - High water erosion rates on existing landforms that have not been specifically designed for natural drainage lines would be reasonably expected to lead to pollution of receiving water bodies through suspended sediments, elevated contaminant of potential concern (COPC) concentrations (McCullough, 2016) and change in physicochemical parameters such as decreased oxygen concentrations (Wetzel, 2001).

58. Section 11.2 (p.91):

"The implementation of the Applied GeofluvTM design on the MacLeans emplacement (also known as VD5) will be monitored to understand its benefits and limitations during the MOP period. From the review a plan for life of mine will be developed. Depending on the review results, other design methods will be included to ensure safety, stability, cost and land use are acceptable for emplacements."

- The Plan should contain a detailed proposal for achieving rehabilitation for the applicable period; it is not enough for the plan to be akin to a strategy to strategize. How will the review occur? What factors will be considered in the review? What performance or other criteria will be used to measure the effectiveness of the design? On what basis does BHP assert that it and only it will decide on what design methods are "acceptable for emplacements"?

59. *Plan 4 of the RMP shows that steep sided existing waste landforms and the pit lake margin to the water's edge will form a next land use of pasture. This figure also shows steep sided void edges and waste emplacements proposed for pasture.*

- How will the void slopes be managed for:
  - erosion;
  - safety for stock and humans; and
  - wind erosion
- It is difficult to accept that such steep and poorly rehabilitated slopes will be able to sustain increased erosion by livestock traffic in addition to the higher erosion. The Mt Arthur Coal Mining Operations Plan FY16-FY20 already identifies that surface (wind or water) erosion is a threat to rehabilitation as it leads "to degradation of growth medium and rehabilitation quality."
- No advice is given in the strategy as to if highwall stability will be addressed, or how. Strategy Figure 11 also indicates that the Macleans Hill Overburden Emplacement Area will form a continuous slope through to the pit void highwall. Generally emplacements require stand-off from pit void edges at a distance determined by geotechnical assessments to prevent failure of the emplacement following failure of the pit void highwall (DoIR, 1997). This key stability closure risk does not appear to have been considered in the Strategy.

60. *Figures 7 and 8.*

- Figure legends are not legible.

Rehabilitation risk assessment summary (Table 6.)

61. *An assessment of environmental risks associated with the operation was undertaken as part of the Modification Project Environmental Assessment the RMP reports.*

- What were the reports respective:
  - scope;
  - methods; and,
  - key findings?
- Will these reports be made available to Council?
- What were the key inherent risks and how has management reduced them?
- What are the key residual risks?

62. There is no detail in the RMP as to how the risk of acid mine drainage (AMD) (common to coal mine sites in particular (Schultze et al., 2011)) has been ascertained and managed. A number of knowledge gaps appear to limit the AMD risk assessment; especially for saline and neutral drainage risk. Indeed, during a 2018 site inspection, BHP staff advised that waste was not characterised for PAF potential. If it is a requirement that these landforms perform in a geochemically non-polluting manner, then it is contingent that the physical and chemical properties of their construction materials are understood. However, assessing waste chemistry (called "waste characterisation") is a fundamental practice to achieving the objective of a non-polluting site (DMP & EPA, 2015; Pearce & Lehane, 2015). This is because large landforms will be constructed from this, otherwise, unknown material.
    - What is the AMD assessment that has been undertaken? What specifically was the methodology and what were the findings?
    - Why has the BHP Global AMD management standard (Pearce et al., in press) not been applied to this site?
63. *Flora and Fauna impacts are shown as "High" risk.*
    - Why is this risk acceptable?
    - What management is being undertaken to reduce this risk?
    - How do offsets, with their delayed and unsure mitigation (Maron et al., 2010), contribute to surety in risk mitigation?
64. *Ecological Assessment.*
    - How did this assessment account for aquatic biota?
65. *Surface Water Assessment.*
    - What CPOCs formed part of this assessment?
    - What were key receptors?
66. *Geotechnical issues (e.g., landform instability)*
    - What were the geotechnical risks for pit voids?
67. *Inadequate or unavailable resources.*
    - What are these resources?

- Have they limited rehabilitation?

Rehabilitation Risk Management (p.40)

68. *Geotechnical*
    - This section describes geochemical and erosion risk instead.
69. *Natural landforms in alluvial materials*
    - How are these landforms relevant to the natural analogues surrounding the project area?
70. *Not all landforms will have Geofluv™, as there are places where it may not be practical to implement due to safety or stability.*
    - Although not described, is rehabilitation cost a reason as well?
    - What places have safety or stability limitations?
    - The Geofluv approach should be applied to all emplacements existing on the site, whether that includes redesign or reconstruction/modification or otherwise. That all emplacements on the site are designed to incorporate natural micro-relief and natural drainage lines is essential and is called for by the terms of the Modified Project Approval. The means of achieving this rehabilitation should be specified in detail in the Plan.
71. *Coal-associated strata includes some material that indicated a potential for acid generation.*
    - Has all this material been accounted for in deep placement?
    - What about fine rejects; how have these been specifically managed as PAF (presumably in the fines dam)?
72. *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.*
    - How has material been determined?
    - How has it been managed?
73. *Incorporating micro relief features throughout overburden emplacements to provide an enhanced naturally appearing landform and fauna habitat.*
    - What do these features comprise?
    - Where have these features been incorporated?
74. *The practical consideration of 'geofluvial type' designs on emplacements to sustainably manage water.*
    - What does sustainably manage water mean?
    - How do these designs sustainably manage water?
75. *Erosion and Sediment Control.*
    - What plant pests are a problem?

- How are they being managed?
- What animal pests are a problem?
- How are they being managed?

76. *Some soils also displayed sodic subsoil properties and measures have been implemented to ensure these materials do not contaminate topsoil resources.*
    - What measures are these?
77. *Spontaneous combustion (SponCom) at Mt Arthur Coal is predominantly confined to old mining areas in the Bayswater No. 2 and the 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). Guidelines for handling of high Spontaneous combustion potential material, such as "...potential spontaneous combustion material should be placed in thin layers, only in the designated active emplacements, and to be rapidly buried with inert cover to a minimum depth of 10 metres"*
    - Why is SponCom only considered a low risk?
    - If SponCom is an issue with these historic areas now; will it continue to present a risk at closure?
    - How will SponCom be managed by the next land holder?
    - How does SponCom present as geochemical risk for pollution presenting from these landforms it has been dumped within?
    - Has all SponCom been dumped to meet the Spontaneous Combustion Control Program; and Overburden Handling and Coal Extraction Procedure Guidelines?
78. *Bushfire preventative measures include fuel load assessment and reduction programs.*
    - How has/does SponCom contribute to bushfire risk?

Rehabilitation Implementation

- At what stage is the mapped current rehabilitation at?

79. *Species composition and community structure criteria for targeted vegetation communities.*
    - How do these target conditions relate to approval requirements?
80. *The ARA is undertaken until the area/structure is determined to be relatively stable by an independent expert.*
    - What does 'relatively stable' mean? And what has been the result of previous auditing for this stability?
81. *The Grazing Potential monitoring program consists of periodic ground and pasture assessments and grazing trials on those areas of pasture rehabilitation and buffer land that are designated as potential post-mining grazing areas.*
    - Are pasture areas fertilised?

- And to what rates, relative to surrounding land areas?
- How does stock carrying capacity compare between rehabilitated and surrounding areas managed similarly e.g., fertiliser rates?
- Do any COPC present at levels of concern?

Measuring Performance against Rehabilitation Objectives and Completion Criteria

Phase-1. Open Cut Voids

82. *"identified and appropriately managed."*
    - What does this mean?
    - Does this term provide:
        - direction to BHP staff; and,
        - surety to stakeholders?
83. *Actual final void dimensions align with hydrological modelling requirements.*
    - What are these 'dimensions'?
    - What are these hydrological modelling requirements?
    - What further modelling plans are proposed?
84. *Hostile geological strata (i.e. carbonaceous, acid generating or spontaneously combustible) covered/sealed before closure. Contaminants less than the assessment criteria.*
    - Why is carbonaceous material hostile?
    - What are the assessment criteria?

Phase-1. Water Management Structures

85. *Sediment dams which assist in the water flow from the final rehabilitation surface will be retained following mine closure.*
    - What long term management impost on the next land user will result from these structures?
86. *Minor, or remote, dams and open drains back-filled to ensure unimpeded landform drainage and seamless integration with surrounding topography.*
    - Why will some dams be backfilled and not removed?
    - Is backfilling sustainable from an erosion perspective?

Phase-1. Tailings Storage Facility (TSF)

87. *Contaminated materials removed from site, treated or capped.*
    - Why is the criterion not to meet state requirements for Contaminated Sites?
88. *"Capping of tailings"*. Is not a criterion. It is an approach to achieve a criterion.
    - What are the closure criteria for the TSF?

89. *Ensure geotechnical stability and successful containment of tailings material and hazardous leachate drainage or seepage.*
    - Is ensuring stability desirable?
    - Is ensuring containment possible?
90. *Monitoring regime established for downstream waters.*
    - "Monitoring". Is not a criterion. It is an approach to achieve a criterion.
91. *Monitoring indicates no evidence of capping instability or environmental harm.*
    - Will monitoring be sufficiently powerful to detect harm? At what level?
92. *Sign off from the Dam Safety Committee that TSF wall integrity is satisfactory based on assessment by a suitably qualified geotechnical engineer.*
    - What about long-term erosion?
93. *Construction of capping layer as per independent consultant's design, or minimum of 3m capping layer of inert material.*
    - Why would an independent expert design be ignored?
94. *Monitoring regime established for downstream waters.*
    - Against what criteria?

Phase-1. Onsite Conservation and Offset areas

95. *Appropriate legal instruments in place to provide long-term protection to onsite biodiversity offset and conservation areas.*
    - What are these instruments, specifically?

Phase-2. Open Cut Voids

96. *Void high walls reshaped to approximately 37 degrees and, if required, protected with berm and trench, or fencing and signage, depending on risk.*
    - Does this angle protect from unacceptable risk? What is this level of acceptable risk?
97. *Implementation of management measures from hydrological report.*
    - What are these measures?
    - What residual risk do they result in?
98. *Monitoring indicates no evidence of harmful impact on downstream waters.*
    - What are these receptors (are they known)?

Phase-2. Water Management Structures

99. *Decommissioned mine water management facilities re-habilitated to stable and non-eroding landforms and/ or watercourses.*
    - Why are "stable and non-eroding" not included as closure criteria?
100. *Demonstrated long-term stability and function of Hunter River alluvials cut-off wall and flood levy.*
    - What is the time span for "long term"?

Phase-2. Overburden Emplacements

101. *Field monitoring and/or survey data analysis indicates reshaped landforms will continue to shed water, with evidence of unplanned pooling, slumping or accelerated erosion comparable to surrounding non-mined landforms of similar topography.*

- This is highly undesirable.

102. *"Field monitoring of surface drainage infrastructure demonstrates that constructed drainage features are functioning as designed with no significant failures.*

- What defines a "significant" failure"?
- How long are these structures intended to function for?
- With what maintenance?
- Who is responsible for long term maintenance?

103. *Emplacement outer slopes will generally have an overall slope angle of 10 degrees, and up to a maximum slope of 18 degrees, with DRG approval and appropriate management.*

- What management is expected?
- For how long is management expected?

104. *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.*

- Why this design parameter?

Phase-3. Rehabilitation - Pasture

105. *Agronomist.*

- What qualifications/certifications should this agronomist possess?

106. *Nutrients.*

- Which? To what concentrations?
- What does "comparable" mean?

107. *Soil Carbon, Nitrogen and Phosphorous levels to be comparable with reference sites.*

- Where are these reference sites?
- What nutrient types/fractions?

108. *No gullies greater than 20cm depth over transects.*

- Why this depth? At what density besides the, undefined, transect occurrence?

Phase-3. Rehabilitation - Native Woodland

109. *"The total number of native plant species is comparable to the local remnant vegetation."*

- Located where?

110. *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.*

- This is a leading indicator; not criteria.
- Why has this habitat's performance in attracting/sustaining biodiversity not been included (the outcome)?

Phase-4. Final Voids

111. *Water monitoring indicates no harmful impact on surrounding surface and groundwater.*

- What are the values (DIIS, 2016d) being monitored for?
- At what point in time will they still be acceptable i.e., long term water quality and associated risk?

Research, Rehabilitation Trials and Use of Analogue Sites

112. *Review proposed post-mining void use to determine whether still achievable, and identify long-term management measures.*

- Of concern, this risk "management" seems to simply reduce expectations for outcomes.

113. *Identify remedial strategy that mitigates and makes safe the immediate failed area, addresses all associated impacts (i.e. reduced void storage capacity, water quality impacts).*

- Has planning identified likely impacts to ensure that they can indeed be acceptably addressed? Otherwise, this statement is merely a strategy to come up with a strategy.

114. *Ecosystem processes (i.e. reproduction, nitrogen fixing and nutrient recycling) not re-established, leading to sterile unsustainable ecosystem.*

- Will monitoring programs measure each of these parameters?

115. *Release of leachate/contaminants from mined materials/ waste material requiring long-term management or treatment.*

- Will monitoring of aquatic biota occur (acute and also for body burdens)?

116. *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.*

- What impacts are predicted?
- What management actions are expected to resolve these?

117. *Unexpected contaminated land, leading to costly treatment and disposal, and delayed relinquishment.*

- Will contaminated pit lake water also trigger Contaminated Sites legislation?

118. *If required, the decommissioning, rehabilitation and final-use strategies for final voids should also be reviewed to determine ongoing suitability.*

- How can this review be achieved when final-uses are undefined?

References

Why have key state e.g., (NSW DT&I, 2014), Commonwealth e.g., (AusIMM, 2012; DIIS, 2016a, b, c, d, f, g) and international e.g., (ANCOLD, 2012; INAP, 2014; APEC, 2018; ICMM, 2019) guidance not formed part of the development of this RMP?

Mt Arthur Coal: Forward Program (Version 1.2, dated 6 June 2019)

The purpose of the document is not described as either a tool to specifically direct staff toward good rehabilitation practice, or as a means with which to engage stakeholders as to the purpose and approach of that practice. The report does not appear to differ markedly from the previous MOP sans the Rehabilitation Strategy. Activities appear to only demonstrate soil rehabilitation and revegetation.

119. Section 1.2.1 Exploration: it is difficult to accept that an "Envirovibe" seismic survey "does not result in any environmental impact". Will seismic survey be restricted to areas that don't contain naïve vegetation?

120. Section 1.2.2 Construction: note among the intended constructions:

a. *"The Edderton Road construction pad, currently located adjacent to the Windmill/Huon Pit high wall, will be relocated to the South. A new access road off Edderton Road will be constructed to service this pad." (emphasis added). This is a matter for Council's approval.*

b. *"The approved realignment of Edderton Road and its intersection with Denman Road, which includes the extension of the existing alluvial cut off wall, the relocation of power lines, water infrastructure and the construction of water/sedimentation dams."*

- The realignment is not approved; the realignment project is subject to a deed entered into by MSC and HVEC.

121. Section 2.1: Council reiterates its concerns with the Rehabilitation Strategy and refers BHP to submissions made in respect of the Rehabilitation Strategy most recently purportedly approved by the Secretary.

122. Section 2.2: The Rehabilitation Schedule should contain more precision and specific timeframes for the completion of each rehabilitation activity with a mechanism accounting for unforeseen circumstances that affect the original schedule. The document purports to be a "program" and Section 2.2 purports to set out a "schedule" but the document merely sets out a series of aspirations or objectives. This does not meet the plain meaning of the words "program" and "schedule", and also the rehabilitation regime mandated by the terms of the Modified Project Approval.

123. There is no scheduling or mention of designing the emplacements to incorporate natural micro-relief and natural drainage lines. The existing emplacements which have not been so designed and constructed must be ameliorated to satisfy the requirements of the Modified Project Approval.

124. The maps containing the disturbance forecasts for each of the relevant years fail to identify the emplacement areas by boundary or even general location.

- These must be identified on the maps – it is impossible to program rehabilitation activities for forward years without the identification of emplacements existing or to be designed and constructed on the mine site.

125. An additional rehabilitation phase should be listed, being the temporary rehabilitation phase, to achieve requirements to take all reasonable steps to be to minimise the total area exposed at any time. This may mean interim stabilisation and temporary vegetation strategies are required in locations not ready for permanent rehabilitation. The long and on-going dry conditions, and the steep slopes of temporary emplacement material stockpiles, have contributed to dust generation from mine sites, particularly on windy days. There is insufficient info on this issue in the draft MOP.

Rehabilitation activity schedule

126. Fill erosion gullies at VD1 (FY17 rehabilitation) to the landform design surface.

- Is there an understanding as to how this gully formed under the previous landform design?
- Is there a significant risk of gully formation in similarly designed landforms?
- How will the repair work be undertaken to achieve;
  - natural water flow; and,
  - sustainable and non-eroding flow?

127. Construct rock lined waterways at VD1 (FY17 rehab) with trapezoidal cross-sections that capture, contain and control concentrated water flows.

- How do these designs reflect natural analogous waterways?

128. A significant amount of fertiliser and gypsum is to be applied to VD1 based on the soil assessment.

- Why were these ameliorants required?
- Is there a significant need for ameliorants in similarly designed landforms?

129. Fill erosion gullies at MacDonald's to the landform design surface and fill erosion gullies at MacDonald's Void (2000 rehabilitation) to the landform design surface.

- Is there an understanding as to how these gullies formed under the previous landform design?

Three Yearly Forecast Cumulative Disturbance and Rehabilitation Progression

130. There is a disparity in disturbance to progressive rehabilitation in that the actively disturbed area is expected to grow 387 (ha, presumably, no units are given) over the AFP period. However, Rehabilitation Land Preparation is only expected to grow by 32 ha. Given the large amount of disturbed land at the project, and the long-time duration for woodland rehabilitation to complete, there is a significant need to reduce this backlog of disturbed land and have more disturbed land progressively rehabilitated.

SUMMARY AND CONCLUSIONS

Leading practice involves more than following prescriptive regulatory requirements, it demonstrates proactive activities directed toward achieving outcomes acceptable to future stakeholders and not just the present (McCullough; Harvey; *et al.*, 2018).

A number of activities involving retrospection, such as review, are proposed to manage hazards that present. However, it would be good to see supporting activities; such as robust planning, proactively manage these issues in a complementary manner.

There is high detail for some elements of rehabilitation, such as soil conservation and pasture revegetation; yet other elements of rehabilitation, which might contribute to significant liability e.g., voids, are left almost entirely unaddressed. Critical gaps in rehabilitation guidance pertain to aquatic habitats; both the pit lakes and also diverted or otherwise impacted creek lines. Little detail is presented on what the closure objectives will be, or how they will be measured. Monitoring is often proposed as a closure criterion. What and how long to monitor for are also key omissions.

Council appreciates the opportunity to comment. Please contact me if you have any questions regarding this response.

Regards

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19 July 2019

Fiona Plesman
General Manager
Muswellbrook Shire Council
PO Box 122
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Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear Fiona

Feedback on the draft Mt Arthur Mine Rehabilitation Annual Forward Program and Rehabilitation Management Plan

HVEC refer to our email of 6 June 2019 attaching a copy of the draft Mine Rehabilitation Annual Forward Program (AFP) and Rehabilitation Management Plan (RMP) for your feedback.

Thank you for your letter of 20 June 2019 providing Council's comments on the documents. In Annexure A to this letter we have responded to each of your comments (adopting the numbering in your 20 June 2019 letter for ease of reference). As you are aware, the RMP is one of a number of documents that govern Mt Arthur's rehabilitation obligations. In some instances Council's comments are addressed by another document or by another section of the AFP or RMP. Where this is the case we have directed Council to the relevant document or section. Many of these documents have previously been provided to Council and we note that these documents are also publicly available on the BHP website.

We are pleased that as a result of this consultation we have identified the following improvement opportunities:

1. Hunter Valley Energy Coal Pty Ltd (**HVEC**) agree that more can be done to enhance the content of aquatic habitat rehabilitation in the RMP. HVEC proposes to commence a study in FY20 into creek reinstatement including aquatic habitat and revegetation with native species. The results of the study would be used to update aquatic habitat rehabilitation obligations in the RMP in FY21. We would be pleased to consult with Council on the scope of the study. In the meantime, the RMP has been updated at section 11 to require HVEC to commence this study in FY20.

2. Many of Council's comments relate to void management. These issues are more appropriately addressed in the Final Void Management Plan. A Final Void Management Plan was provided to Council for consultation and was submitted to the Department on 29 June 2018. An updated Final Void Management Plan for FY20 is currently under preparation. Further work is being undertaken by HVEC to understand alternative options for voids and vegetation compatible with those options. This work will be progressed in FY20 and further discussed with Council.

3. We have made a number of Council's suggested changes to improve the readability of the RMP, including:

- updating the legend in Figure 1B to indicate that the roman numerals denote land use capability;
- adding the infrastructure required to enable a viable grazing operation post rehabilitation to Table 5;
- various minor amendments to reflect Council's comments at [41], [47], [49], [51], [53], [60], [68], [80], [83], [101], [108], [113] [119] and [124];

4. Consultation with DPE also identifies these items for improvement for the next revision of the RMP:
   - Improve rehabilitation criteria by making more quantitative.
   - Improve alignment of rehabilitation risks with draft guidelines
   - Rehabilitation monitoring expansion and alignment with criteria
   - Improve rehabilitation schedule with more targeted timeframes

Revised versions of the RMP and AFP with the changes made as a result of Council's feedback are **attached**. These versions have been submitted to the Department for approval.

HVEC agrees with Council that leading practice involves more than following prescriptive regulatory requirements. HVEC employs a robust proactive planning process as described in the Rehabilitation Strategy and the RMP. HVEC would be happy to meet with Council representatives in person for an interactive mine planning presentation session to demonstrate this process.

We thank Council for their comments and look forward to working further with Council on the opportunities identified above.

Yours sincerely

Luke Neil

Annexure A

Paragraph Number	Muswellbrook Shire Council Comment	BHP Response
1	Council joins in its previous submissions regarding the Rehabilitation Strategy referred to in the RMP. To the extent that the RMP is based on the purported Rehabilitation Strategy, which Council maintains is deficient in fundamental respects, the RMP in Council's submission cannot meet the requirements of condition 44 of the Modified Project Approval.	Council's challenge to the Secretary's approval of the Rehabilitation Strategy was unsuccessful at first instance and is currently the subject of an appeal by Council to the Court of Appeal. We do not propose to restate our arguments in those proceedings here. We consider that the RMP does satisfy the requirements of Condition 44 of Project Approval 09_0062 MOD 1 Mt Arthur Coal Mine – Open Cut Modification Project dated 26 September 2014 (**Project Approval**).
2	The RMP states that there was a project undertaken to research a landform approach that would align with community expectations and improvements in landform design techniques. The report cites a report by Landloch Pty Ltd (2014) capturing project findings now incorporated into the Applied Geofluvial landform. • Is a copy of this report available for Muswellbrook Shire Council's viewing? • Can BHP demonstrate how findings have been incorporated, both generally and specifically?	• A copy of the report by Landloch Pty Ltd (2014) (**Landloch Report**) is **attached** to this response. • The adaptation of the Geofluv design incorporates the findings of the Landloch Report and includes natural drainage (waterway) design and erosion risk assessment and management. The Landloch Report was used to inform the erodibility of the materials and the assessment of stable profiles. These values were used together with the Geofluv software to design new final landforms for Mt Arthur. Additional information on the Geofluv design process is included in the draft revised Rehabilitation Strategy provided to Council in June 2018 (see section 6.3 and appendix 4 which explain the design approach used and page 49 which explains erosion management).
3	… • How have Landloch concerns about the inappropriateness of an erosion modelling technique that requires an assumption of alluvially-formed analogue sites been addressed (Bugosh, 2008; Howard et al., 2011)? • How has management of erosion been planned for: ○ The pit lake catchment; and ○ The constructed waterways	• The draft revised Rehabilitation Strategy provided to Council in June 2018 explains the design approach used (Section 6.3 and appendix 4) and erosion management (page 49). The erosion and sediment control plan (publicly available) provides detail on operational management of erosion. • The Rehabilitation Strategy also provides information on how management of erosion has been planned for in catchment design and waterways (natural drainage lines). The FVMP provides further information on the pit lake catchment and design. The design methodology used is an adaptation of the Geofluv approach. The approach combines the use of erosion modelling techniques and standard hydrological engineering.
4	… • What are local waterway flood levels appropriate to closure planning for more extreme events e.g., Probable Maximum Flood (PMF)? • Are the blue polygons pit lakes? What water level does the polygon area indicate and why this level? Why are pit lakes not included in the figure legend? • What is the risk of: ○ river inflow to the pit lakes; and, ○ decant from pit lakes? • What do Roman numerals on Plan 1B indicate? Why are they not in a legend? • Why are pit lakes designated with land capabilities?	• The flood objective 1 in 100 annual return interval (ARI) is a Project Approval minimum requirement (Project Approval, Table 14). Flood planning is discussed on page 14 and 15 of the draft revised Rehabilitation Strategy provided to Council in June 2018. Also the FVMP was provided to Council in June 2018 which addresses this comment on pages 11, 18 and 21. In summary: "*Presently the risk of interaction with a Hunter River flood is mitigated by a levy that has been constructed along the northern boundary of the northern pit. Flood modelling of the Hunter River indicates a 0.1% annual exceedance probability (1,000 year Annual recurrence interval (ARI)) flood level of up to approximately 140 mRL at the northern end of the void along Denman Road. Therefore the backfilled section of Northern final void will be raised above 140 mRL to prevent flooding over the top of the spoil."* • The Blue polygons are water management domains, which are commonly used in NSW mine planning. The water level is the approximate maximum water level. Pit lakes are not required to be labeled by the NSW Code of Practice RMP guidelines. HVEC will label the final voids. • The risk of river inflow to pits and decant is discussed in the FVMP. • The roman numerals on Plan 1B indicate land use capability. HVEC has updated the figure legend. • This figure shows land capability pre mining and is not necessarily the final land use of the pit.

5	The RMP states that this strategy must *(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.* • How were options investigated for increasing woodland rehabilitation area and decreasing final void size? What was the outcomes to both investigations? • How has beneficial end use of disturbed areas been investigated? In particular; how has end use of voids been investigated; both the risk (drowning, pollution) and opportunity? • What are the "detailed rehabilitation objectives" for final voids? How were these determined? What are their associated closure criteria?	• Council's comment misquotes Table 2 of the RMP. The requirements cited by Council are contained in Condition 42 of the Project Approval and relate to the Rehabilitation Strategy.
6	… What performance and completion criteria have been established for: • long term erosion; • final pit voids (dry and as lakes); and, • waterways (Constructed and receiving)?	• Closure criteria can be found in table 4 of the draft revised Rehabilitation Strategy and table 5 of the RMP. Furthermore section 10.2 of the RMP elaborates on measuring performance against completion criteria. • The FVMP specifically discusses final voids. • The Surface Water Monitoring Program discusses monitoring locations and provides more detail on triggers (performance criteria) for waterways.
7	… What measures are proposed to ensure compliance with overall long-term erosion, voids, and waterways as above?	• Control measures are built into the landform design, construction and revegetation and provide the foundation for a safe, stable and non-polluting landform. Monitoring, maintenance and improvement are described in Section 10 of the RMP. These processes will continue post closure until the Regulator is satisfied to approve completion of the rehabilitation. Continued monitoring may continue post this point as identified closer to closure. • Closure criteria can be found in table 4 of the Rehabilitation Strategy and table 5 of the RMP. Furthermore section 10.2 of the RMP elaborates on measuring performance against criteria. The FVMP specifically discusses voids.
8	How has, or will research specifically address overall long term erosion, voids, and waterways as above?	• Section 11 of the RMP describes the research proposed which includes further work on final voids. This work will be discussed with MSC as it is progressed.
9	How has, or will monitoring and independent auditing be conducted to specifically address overall long-term erosion, voids, and waterways as above?	• Section 10.1 of the RMP discusses monitoring which also includes erosion monitoring. • The Annual Rapid assessment described in Section 10.1 of the RMP provides recommendations for maintenance and improvement to constructed landforms including waterways. This is completed by an independent consultant annually. There is a 3 yearly independent audit provided to DPE as required by the Project Approval. The Resources Regulator inspects MAC annually for rehabilitation.
10	The RMP states that it complies with the new RMP for large Mines guidelines from the Resource Regulator (previously DRE). Is this view achieved in the view of the Resource Regulator?	• The RMP is yet to be submitted for approval with the Resources Regulator and is currently provided to Council for consultation in accordance with Condition 44 of the Project Approval.
11	EPBC Approval 2011/5688, Condition 4 - The RMP notes that action must commence for progressive regeneration of 1915 ha of woodland and forest communities, including 299.20 ha of Box Gum Woodland within 1 year of commencement of construction. Has regeneration of all of this vegetation been undertaken to this schedule?	• Yes. Progressive regeneration of 1915 ha of woodland and forest communities, including Box Gum Woodland started within 1 year of commencement of construction. Rehabilitation of disturbed areas occurs annually and those areas identified in the RMP Figure 5 for woodland regeneration are executed as the emplacements become available. • Rehabilitation progression is shown in the AFP figures 2a, b, c and also in the RMP Figure 9.
12	Mining Tenement ML 1358 … • How are/will voids being treated to ensure slope stability (geotechnical and erosion) and to make steep sides and drowning hazards for stock and humans safe? • How is runoff from disturbed areas, both operationally and rehabilitated, be managed to prevent erosion? • What monitoring data supports that this management is effective?	• The FVMP provides information on safety for final voids and this is also presented in the Rehabilitation Strategy on page 25. • Please see RMP page 41 and for further detail the publicly available and approved Erosion and Sediment Control Plan. • Surface water monitoring data is provided and discussed annually in the Annual Environmental Management Report provided publicly and specifically to the MSC.
13	Mining Tenement ML1487 … • How is waterway water quality monitored and appropriately managed for all contaminants of potential concern (COPC) elevated due to mining activity?	• Please see RMP page 41 and for further detail the publicly available and approved Surface Water Monitoring Program and the Erosion and Sediment Control Plan which includes COPC and triggers. • Surface water monitoring data is provided and discussed annually in the Annual Environmental Management Report provided publicly and specifically to the MSC.

	• How is waterway habitat monitored and managed to mitigate mining impacts on aquatic biota habitat; both of vertebrates and lower orders of aquatic food webs?	
14	Mining Tenement ML1548 … How is or will public safety be managed for; • deep erosion • steep cliffs and highwalls; and, • void sides and depth?	• The revised draft Rehabilitation Strategy on page 25 and the FVMP provide information on safety for final voids including access, geotechnical stability and spontaneous combustion.
15	Mining Tenement CCL 774 … • What are the end uses for all project area domains? • How are these end uses demonstrably agreed/sustainable?	• Figure 5 of the RMP shows final land use, predominately woodland and grazing. The land use is approved in the Project Approval. Further work is being done to understand other opportunities for voids and this will be discussed with MSC.
16	Water management is an oblique activity and not an end use (McCullough; Schultze; et al., 2018). What is the end use of the proposed pit lakes?	• The void final land use is discussed in the Rehabilitation Strategy and expanded on in the FVMP. The Northern void is proposed as a groundwater sink and the other two final voids will be water storage. These are water management area domains.
17	Stakeholder Consultation - Further study of the Geomorphological design will continue to meet stability, land use, safety and cost requirements. • What are the specific requirements for each of these items (stability, land use, safety and cost)?	• The design is reviewed annually during the MAC planning process to ensure it will function to meet Approval requirements, safety, landuse, cost and stability. For example the current Northcut tailings dam capping study is developing a cap that will be suitable for the final land use of grazing. Steepness of slopes is assessed to ensure required equipment will be able to safely execute work.
18	• What are the rehabilitation “treatments” and revegetation plans for voids? • How have these been determined? And what is their purpose (to what objectives and criteria)?	• The FVMP provides information on final void treatment and this is also presented in the draft revised Rehabilitation Strategy on page 25. • 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 MAC, with pit walls continually intersecting various faults and dykes at different angles. It will also allow HVEC 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.
19	• How will creek lines be rehabilitated to maintain water quality and aquatic habitat? • How will this be measured? And to what objectives and criteria?	• Please see table 2 of the RMP page 20 and 21. This table explains how requirements are addressed. • Detailed measurement trigger information is found in the Surface Water Monitoring Program. • HVEC agree more can be done to enhance the content of aquatic habitat rehabilitation in the RMP. A study will be commenced in FY20 with the results updated to the RMP.
20	What remedial activities have been required in the past and/or is expected in the future? How has remediation occurred/is planned to occur?	• Section 7 and 10.1 of the RMP discuss monitoring and this is reported on in the AEMR annually. • Remedial activities mainly relate to minor erosion control and additional seeding/planting in areas identified during the ARA.

21	Tailings Storage Facility. A detailed tailings dam dewatering and capping methodology will be developed.
	• When? To what standards or guidance?
		• Each tailings dam closure is required to meet the criteria in table 5 of the RMP. Each dam requires its own assessment at the time of closure and this will be discussed with the Resources Regulator.
		• In general, but not limited to the guidance docs below:
		  ○ Final Cover Performance in the Australia Environment – The A-ACAP Field trials (Salt et al. 2014); and;
		  ○ Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure Australian National Committee on Large Dams (ANCOLD 2012.

22	• Given the specificity of this thickness, why this thickness? • What is the purpose(s) of the cap? What sort of material?	• Each tailings dam closure is required to meet the criteria in table 5 of the RMP. Each dam requires its own assessment for capping design including thickness at the time of its closure and this is currently in discussion with the Resources Regulator for North cut tailings dam. 3m is proposed as a minimum thickness, with the actual design completed by an expert consultant. • Capping design will achieve - reduced rainfall percolation and infiltration to the underlying tailings and ultimately reduced seepage expression from the TSF, barrier to incidental contact between potential receptors and underlying tailings (contamination), growth medium to support sustained vegetation communities and provide a surface from which clean runoff will flow. • Materials are subject to the design by the expert consultant in order to meet the capping objectives.
23	Overburden emplacements. Remaining sediment dams integrated into surrounding catchment and drainage lines. • How will water bodies in previously rehabilitated areas be integrated into drainage lines? • What is the purpose and nature of these drainage lines?	• Sediment dams are operational controls and are rehabilitated at closure to integrate with the landform. An example of this will be the northern end of side MacLeans hill emplacement where a sediment dam will operate at the base of the land form and another further up the slope. These will remain in operation until monitoring shows ground cover is achieving the required erosion stability. Erosion is measured through the Surface Water monitoring Program. • The drainage lines (waterways) function similar to natural waterways to shed water from the landform.
24	Conservation Areas. Remaining dams will be decontaminated and converted to clean water structures. • Why? • What contaminants are expected? • What is the purpose (objectives and associated criteria) of these structures i.e., what is the water supply for?	• To provide water for aquatic habitat • Potential contaminants are salt and metals.

25	Rehabilitation objectives and completion criteria The terms ‘objectives’ and ‘criteria‘ seem to be used interchangeably suggesting some confusion as to the separate purpose of each? • How does the use of these terms fit with BHP corporate closure standard definitions?	• Section 5 of the RMP defines objectives and criteria and align with the NSW Resources Regulator definitions provided to HVEC. new Guidelines will be released by the Resource Regulator and at this time HVEC will review and make changes if required.
26	Each progress benchmark is selected from, or supported by, relevant and authoritative sources. • Can these sources be made available and linked to the specific development of each criterion? • In particular, what leading industry guidelines have directed Mt Arthur closure planning; and how?	• The main documents used for development of criteria are ○ DIIS (Department of Industry, Innovation and Science) (2016c), Mine rehabilitation, Australian Government, Canberra. ○ Code of Practice: Annual Rehabilitation Management Plan for Large Mines (2018 Draft). Published by NSW Department of Planning and Environment, Resources Regulator •
27	… What performance and completion criteria have been established for: • long term erosion; • final pit voids (dry and as lakes); and, • waterways (Constructed and receiving)?	• Section 5 of the RMP clearly defines objectives and criteria and performance indicators • HVEC agree more can be done to enhance the content of aquatic habitat rehabilitation in the RMP. A study will be commenced in FY20 with the results updated to the RMP.
28	Few of these completion criteria are, in actual criteria e.g., Closure criteria and proposed final land use developed through stakeholder consultation. Instead, they are narrative around the actual criteria; which are left undefined and leave the reader with no concept as to what closure vision is proposed.	• Section 5 of the RMP clearly defines objectives and criteria and performance indicators
29	Landforms are independently assessed as safe and stable compatible with surrounding natural landscape. • By whom? • What discipline and qualifications? • How compatible? • What if they are not? what redress is expected?	• The NSW Resources Regulator will be consulted to identify suitable consultant or consultants to assess the final landform. • In addition, expert design consultants are used during the design and construction process.
30	Restoration of mined land achieves visual amenity. • Of whom? • How measured?	• Refer to Section 7.2.1 of the RMP for a list of the measures designed to reduce the visual impact. These measures include 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.
31	TSF capped to ensure long-term containment of emplaced material and sustains proposed land use. • What about chemical stability of emplaced material? • What is this end use?	• Each tailings dam closure is required to meet the criteria in table 5 of the RMP. • Each dam requires its own assessment at the time of its closure and this will be discussed with the Resources Regulator on a case by case basis. The North cut tailings dam is currently being studied for closure and is in discussion with the NSW Resources Regulator.
32	… As construction of the historical landforms does not appear to have accounted for erosive fluvial geomorphological processes, it suggests that erosion of these landforms is likely to be elevated above that of natural landforms and that this will likely beget difficulties with the mine’s ability to meet closure criteria of safety and being non-polluting.	• The landforms have been constructed to reduce erosion. All landforms (natural or rehabilitated) are subject to erosion. These issues are monitored and controlled as per the RMP, section 10.
33	Agricultural land - Revegetation has facilitated fauna recolonisation and landscape function. • To what degree? • How is it known when this is achieved?	• The criteria is presented in Table 5 of the RMP. Rehabilitated land is monitored using the Rehabilitation and Ecological Monitoring Procedure and is reported in the AEMR. • The rehabilitated pasture land will be assessed by an independent consultant: ○ to show that rehabilitated land intended as grazing pasture in the post-mining landscape incorporates the landscape, soil and pasture characteristics that indicate the capacity to support sustainable beef cattle grazing; and ○ to Determine the requirement for maintenance, remedial treatment or modification of rehabilitation and land management measures that would further improve the grazing potential.
34	Plant communities are creating effective habitat linkages and are aligned to surrounding native vegetated lands • Habitat linkages for what? ”Aligned” to what? How is it known when this is achieved?	The draft revised Rehabilitation Strategy provided to MSC in June 2018 page 29 explains the connection. 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 aligned with the publicly available Synoptic Plan (Department of Mineral Resources 1999, Synoptic Plan: Integrated landscapes for Coal Mine Rehabilitation in the Hunter Valley of NSW)
35	Return appropriate areas of land to sustainable grazing use.	Noted. The RMP returns suitable land to sustainable grazing use in accordance with the Project Approval.
36	Table 5 should reference installation of infrastructure required to enable a viable grazing operation post rehabilitation (some infrastructure is identified separately on p55).	HVEC will add infrastructure required to enable a viable grazing operation post rehabilitation to Table 5.
37	Designed as long term groundwater sinks and to maximise groundwater flows across back-filled pits to the final void. As with flood risk; whether or not a pit void lake has been designed as a long-term groundwater sink requires a similar water balance modelling approach as does flood interaction risk (McCullough; Marchand; et al., 2013). • Has water balance modelling been undertaken for all final voids? • What were the findings and assumptions (McCullough; Marchand; et al., 2013)? • How have groundwater flows been maximised?	• Please see the FVMP for modelling information. Catchment areas are currently minimized to allow maximum flow to the surrounding natural drainage system as required by the Project Approval. • Further study is proposed for final voids and this will be discussed with MSC.

38	Minimise to the greatest extent practicable: the size and depth of final voids the drainage catchment of final voids. • How has this minimisation been undertaken; what were the drivers? • What were the key objectives?	• Please see the FVMP. Catchment areas are currently minimized to allow maximum flow to the surrounding natural drainage system as required by the Project Approval. • The main driver is to provide additional area for terrestrial land uses similar to surrounding areas such as grazing.
39	Any high wall instability risk. • How has stability risk (geotechnical and erosional) been investigated? • What were the findings and assumptions?	Please see the FVMP. Catchment areas are currently minimized to allow maximum flow to the surrounding natural drainage system as required by the Project Approval.
40	• Has water balance modelling been undertaken for interaction of all final voids with closure scale events e.g., probable maximum flood (PMF) (APEC, 2018)? • What were the findings and assumptions?	The flood objective 1 in 100 ARI is a Project Approval minimum requirement. The FVMP was provided to MSC June 2018 which addresses this comment on page 11, 18 and 21. An extract is shown below. The flood risk is also discussed on page 14 and 15 of the Rehabilitation Strategy. Presently the risk of interaction with a Hunter River flood is mitigated by a levy that has been constructed along the northern boundary of the northern pit. Flood modelling of the Hunter River indicates a 0.1% annual exceedance probability (1,000 year Annual recurrence interval (ARI)) flood level of up to approximately 140 mRL at the northern end of the void along Denman Road. Therefore the backfilled section of Northern final void will be raised above 140 mRL to prevent flooding over the top of the spoil.
41	Final voids assessed by a qualified geotechnical engineer for stability and do not pose a safety risk. • How is “safety risk" defined? • What detail as to safety will be incorporated eg, safety factors? • What management will be undertaken to manage all void safety risks (Ross & McCullough, 2011): • falls; and, • drownings (Hatch, 2007)?	• The FVMP provides information on safety for final voids (page 5) and this is also presented in the Rehabilitation strategy on page 25. Where a plausible safety hazard is identified the mitigation strategies that HVEC will implement include: ○ Erection of fencing, potentially including a trench and berm ○ Placement of warning signs ○ Cutting off access infrastructure such as tracks and roads, where compatible with final land use ○ Elimination of features that could promote recreational attraction, where compatible with final land use ○ Maintenance agreements for the above mitigation measures ○ Expert assessment of safety risk will be undertaken to verify that appropriate risk controls are implemented and demonstrate that all reasonable and practicable measures have been applied. • The current identified option for the end use of groundwater sink does not benefit from changing the internal design or aesthetics beyond implementing controls that meet stability and safety criteria. However, HVEC will continue to monitor and assess the viability of alternative land uses. • HVEC will re-word “not pose a safety risk”
42	Void use is compatible with long-term void relinquishment options. Repurposing of pit voids requires considered planning (McCullough; Schultze; et al., 2018) • What are these long-term void relinquishment options? • How is compatibility demonstrated? • How has the particular rehabilitation needs of revegetating closure to the pit lake edge (riparian, littoral) been considered (Van Etten, 2011)?	• Please see Section 6.2 of the Rehabilitation Strategy which discusses void options. • Further work to improve knowledge on alternate options and vegetation compatible with those options will be progressed in FY20.
43	• What will the long term water quality be? • Will this water quality present any risk to either humans, stock or wildlife? • How will this risk be managed?	• Please see the FVMP. Catchment areas are currently minimized to allow maximum flow to the surrounding natural drainage system as required by the Project Approval. Safety for humans and other animals is also discussed in the FVMP. • Further study is still underway to inform the final management actions.
44	No long term groundwater impact to downstream users. • How has this been demonstrated?	• Please see the FVMP. Catchment areas are currently minimized to allow maximum flow to the surrounding natural drainage system as required by the Project Approval • Further study is still underway to inform the final management actions.
45	• What are the objectives and criteria for these? • What process defined them?	• Please see performance indicator in Table 5 of the RMP. • The objectives and criteria are based on the risks for each domain.
46	• Why is stable and non-eroding desirable? • Is stable and non-eroding achievable? • How will stable and non-eroding specifically be achieved (Tip: more than hydrological assessments are required)? • How will monitoring demonstrate achievement of stable and non-eroding? • What sort of ecosystem is desired?	• Non-eroding is intended to mean that the landform will erode correspondingly to surrounding similar land uses. • Please see section 7.2.1 of the RMP. Modeling is completed on the landform design before execution of the design to understand erosion risk and controls. • Monitoring is explained in section 10 of the RMP • The desired ecosystems are primarily Native woodland and grazing.
47	Rehabilitated water management features will be re-instated and managed as stable, non-eroding and non-polluting landform features. • This ‘detail’ merely paraphrases the oft repeated broad aim for “stable, non-eroding and non-polluting landforms" and moreover states that landforms will “...not be eroding”. Landforms should all be eroding; erosion is impossible to prevent.	Agree and will update in Table 5.

48	• Without detail it remains unclear as to how creek diversions will be rehabilitated; including as to exactly what native species will be used in the rehabilitation. • No plans for habitat enhancement as an objective of rehabilitated creek diversions is indicated by the RMP.	• The use of native vegetation for rehabilitation is already committed to in Table 5 “Native vegetation selection incorporates local species and sourcing seed of local provenance (where possible)” and does not need to be repeated. • A geomorphic study has been completed that will inform designs for specific Creek lines in the future. • HVEC agree more can be done to enhance the content of aquatic habitat rehabilitation in the RMP. A study will be commenced in FY20 with the results updated to the RMP.
49	To be decommissioned and removed, unless agrees otherwise DRE. • This statement has typos	HVEC will re-word.
50	Plan 4 (p.33) includes markings referring to “Edderton Road Realignment Options". • Now a final route has been selected only that route should be shown.	• The markings form part of the Project Approval and should not be removed.
51	Sustainability and diversity demonstrated by assessment of vegetation type, land use type and suitability to final landform. • Assessment’ is a method and not a criterion	Agreed, HVEC will remove the word assessment.
52	Ongoing management requirements no greater than adjacent non—mined land How is ‘greater’ defined?	These are in the RMP defined by the performance indicator in the last column of Table 5.
53	Post-mining land use is compatible with surrounding land use in terms of optimal social and economic benefit (local and wider community) • Optimal social and economic benefit’ is a very strong statement; how is ‘optimal’ defined and how will it be measured?	Agree, the intent of the statement is to show that the chosen land use will be appropriate for the location in regard to social and economic benefit. HVEC will remove the word ‘optimal’.
54	The Offset Area adjoining Thomas Mitchell Drive may actually be best suited to industrial uses, making use of public infrastructure, and allowing additional employment generating activities.	This area is now under a Conservation Agreement and is required to meet the conditions of that agreement.
55	What are key community concerns about: • Operations; and • closure? How are these concerns specifically addressed in the RMP	• Community concerns are reported in the AEMR and are addressed with the person/people who raise the concern.
56	How does pre-existing rehabilitation differ from the FLDP in this way	• Two main features are different: contour drains and linear water drop structures.
57	High water erosion rates on existing landforms that have not been specifically designed for natural drainage lines would be reasonably expected to lead to pollution of receiving water bodies	• HVEC disagree. Please see RMP page 41 and for further detail the publicly available and approved Erosion and Sediment Control Plan. • Surface water monitoring data is provided and discussed annually in the Annual Environmental Management Report provided publicly and specifically to the MSC
58	The Plan should contain a detailed proposal for achieving rehabilitation for the applicable period; it is not enough for the plan to be akin to a strategy to strategize. How will the review occur? What factors will be considered in the review? What performance or other criteria will be used to measure the effectiveness of the design? On what basis does BHP assert that it and only it will decide on what design methods are “acceptable for emplacements”?	• The AFP provides the detailed rehabilitation and disturbance plan for the 3 year period. • Overall design to date is shown in the final landform figure 5 in the RMP. • Table 5 of the RMP shows the criteria for rehabilitation. Furthermore the annual monitoring programs (Section 10 of the RMP) describe monitoring for stability, erosion, water quality and flora and fauna. • The Resources Regulator decides whether the proposed design is appropriate.
59	How will the void slopes be managed for: • erosion; • safety for stock and humans; and • wind erosion	• Figure 5 (plan 4) of the RMP, even though pasture is shown as a land use this does not mean that all areas within the zone will be grazed or that these areas won’t have woodland species. Typical grazing country is a mix of wooded areas, waterways pasture and often rocky or steep areas not suitable for stock. Steep areas that are not as suitable for grazing of pasture will be vegetated appropriately as directed by the rehabilitation consultant and commensurate with the final land use locations in figure 5. • As above information on safety is presented in the Rehabilitation Strategy on page 25 and the FVMP.
60	Figures 7 and 8. Figure legends are not legible	• HVEC will amend figures to ensure legends are legible.
61	An assessment of environmental risks associated with the operation was undertaken as part of the Modification Project Environmental Assessment the RMP reports What were the reports respective: • scope; • methods; and, • key findings? • Will these reports be made available to Council? • What were the key inherent risks and how has management reduced them? • What are the key residual risks	• The environmental Risk assessment (Mt Arthur Coal - Mt Arthur Coal Open Cut Modification Project Environmental Assessment (2012), Appendix L – Environmental Risk Assessment) has been publicly available on the BHP website since 2014. This risk assessment included consultation with Council. • The key risks are also described in the RMP Section 7.
62	• What is the AMD assessment that has been undertaken? • What specifically was the methodology and what were the findings? • Why has the BHP Global AMD management standard (Pearce et al., in press) not been applied to this site?	• AMD assessment was also completed for the Mt Arthur Coal - Mt Arthur Coal Open Cut Modification Project Environmental Assessment (2013), Appendix I – Geochemistry Assessment of Overburden and Interburden) and has been publically available on the BHP website since 2014.

		• AMD is classified as low risk. AMD is discussed in section 7.2.1 and table 11 of the RMP. Coal-associated strata includes some material that indicated a potential for acid generation. Coal- associated overburden (and coarse rejects) requires selective handling and burying at depths greater than 5m. This is reflected in the emplacement design and construction requirements contained in the Mt Arthur Coal Dump 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 will have done the gap assessment for MAC by end of FY20.
63	Flora and Fauna impacts are shown as "High" risk. • Why is this risk acceptable? • What management is being undertaken to reduce this risk? • How do offsets, with their delayed and unsure mitigation (Maron et al., 2010), contribute to surety in risk mitigation?	• Please see section 7.2.6 of the RMP. • Offsets are selected and approved to offset the risk. Further benefits come from areas being cleared incrementally as they are required for an activity and progressive rehabilitation which provides habitat while the mine is in operation. Habitat trees (stag trees), trees with hollows and other vegetation are selected during clearing for addition back onto rehabilitation areas to promote habitation of fauna. • Offsets are a legal requirement of the Project Approval and EPBC approval.
64	Ecological Assessment. • How did this assessment account for aquatic biota?	• Please refer to the monitoring section 10 of the RMP. Annual monitoring is reported on in the AEMR. • HVEC agree more can be done to enhance the content of aquatic habitat rehabilitation in the RMP. A study will be commenced in FY20 with the results updated to the RMP.
65	Surface Water Assessment. • What CPOCs formed part of this assessment? • What were key receptors?	• Please see section 7.2.4 of the RMP. • Monitoring is completed annually as per the Surface Water Monitoring Program which includes detailed triggers and is reported in the AEMR
66	Geotechnical issues (e. g., landform instability) • What were the geotechnical risks for pit voids?	• There are two different types of stability that HVEC 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. • 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 MAC, with pit walls continually intersecting various faults and dykes at different angles. It will also allow HVEC 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. • This has been addressed in the Rehabilitation Strategy and the FVMP and HVEC will add reference in the RMP.
67	Inadequate or unavailable resources. • What are these resources? • Have they limited rehabilitation?	• These could be personnel, plant or finance. They are covered through the NSW resources regulator requirement for Rehabilitation Cost Estimate security. • Resources have not limited rehabilitation.
68	Geotechnical • This section describes geochemical and erosion risk instead	• HVEC has updated title • Erosion is specifically discussed in the section 7.2.2 following the Geotechnical / geochemical section 7.2.1
69	Natural landforms in alluvial materials • How are these landforms relevant to the natural analogues surrounding the project area?	• Please see section 6.3 of the draft revised Rehabilitation Strategy. 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.
70	Not all landforms will have Geofluv™, as there are places where it may not be practical to implement due to safety or stability. • Although not described, is rehabilitation cost a reason as well? • What places have safety or stability limitations? • The Geofluv approach should be applied to all emplacements existing on the site, whether that includes redesign or reconstruction/modification or otherwise.	• Not all landforms have Geofluv as not all landforms were required to have Geofluv. HVEC has not relied on cost as a reason not to implement Geofluv prospectively. Consistent with its position in the appeal proceedings brought by Council, HVEC considers that applying Geofluv to the entirety of the Site (including areas already previously rehabilitated) is not required by the Modified Project Approval and would be unwarranted given the stability of existing areas, safety and stability constraints for certain domains identified, as well as cost, time, and detrimental environmental and third party impacts. • Examples of places with safety or stability limitations are tailings dams and final voids which have constraints for design and landuse. • We are aware of Council's position which is currently the subject of an appeal by Council.
71	Coal-associated strata includes some material that indicated a potential for acid generation. • Has all this material been accounted for in deep placement? • What about fine rejects; how have these been specifically managed as PAF (presumably in the fines dam)?	• AMD is classified as low risk. • AMD is discussed in section 7.2.1 and table 11 of the RMP. Coal-associated strata includes some material that indicated a potential for acid generation. Coal- associated overburden (and coarse rejects) requires selective handling and burying at depths greater than 5m. This is reflected in the emplacement design and construction requirements contained in the Mt Arthur Coal Dump Standard. • Coal fines are managed in the tailings dams. • Further study on geochemistry is underway and will be available end of FY20, which will provide additional risk information and potential options for further monitoring or controls. If the study identifies updates for the RMP they will be included in the next revision.

72	The geochemical assessment also analysed overburden material for potential sod/city, and determined a moderate to high potential for sod/c spoil to be uncovered during mining. • How has material been determined? • How has it been managed?	• Please see section 7.2.3 of the RMP for material assessment. Further study on geochemistry is underway and will be available end of FY20, which will provide additional risk information and potential options for further monitoring or controls. • Higher sodic material is managed by covering with lower sodic materials. The sodic material within the top 1m of the landform surface is treated with gypsum to improve plant colonization and reduce erosion.
73	Incorporating micro relief features throughout overburden emplacements to provide an enhanced naturally appearing landform and fauna habitat. • What do these features comprise? • Where have these features been incorporated?	• Please see section 7.2.6. placement of recovered habitat features such as logs, stags, tree hollows, rip lines and rocks • These features are incorporated across all rehabilitation on the site.
74	The practical consideration of 'geofluvial type' designs on emplacements to sustainably manage water. • What does sustainably manage water mean? • How do these designs sustainably manage water?	• "Sustainably manage water" refers to the design resulting in a landform that can shed water long term (sustainably). • Please refer to section 7.2.2 and 7.2.4 of the RMP and the Rehabilitation Strategy, Section 6.3.
75	Erosion and Sediment Control. • What plant pests are a problem? • How are they being managed? • What animal pests are a problem? • How are they being managed?	• Please see section 7.2.6 of the RMP. • Pest monitoring and management is reported in the AEMR. Annual monitoring program informs when and where pests and weeds are occurring so that management can occur. • Please see the Annual Forward Program (Table 2. Rehabilitation activity schedule) for more information on management of pest species.
76	Some soils also displayed sodic subsoil properties and measures have been implemented to ensure these materials do not contaminate topsoil resources. • What measures are these?	• Please see section 7.2.3 of the RMP. Topsoil is stored separately and or directly placed on top of the subsoil layer of rehabilitated areas. Subsoils are treated for sodicity to 1m with gypsum.
77	Why is SponCom only considered a low risk? If SponCom is an issue with these historic areas now; • will it continue to present a risk at closure? • How will SponCom be managed by the next land holder? • How does SponCom present as geochemical risk for pollution presenting from these landforms it has been dumped within? • Has all SponCom been dumped to meet the Spontaneous Combustion Control Program; and Overburden Handling and Coal Extraction Procedure Guidelines?	• Section 7.2.8 explains the management of spontaneous combustion and management is also reported on in the AEMR. • Spontaneous combustion will be controlled in these areas before relinquishment. • The Spontaneous Combustion Control Program contains operational details on measures implemented to identify, assess, handle, treat and monitor spontaneous combustion, and materials with potential to cause spontaneous combustion. Spontaneous Combustion monitoring and management is reported on in the AEMR annually. • No, not all potential spontaneous combustion material was dumped to the Overburden Handling and Coal Extraction Procedure Guidelines in the past. As described in the RMP section 7.2.8 the previous mine area of Bayswater No. 2 is the main place where Spontaneous Combustion occurs. These areas are monitored and managed as per the Spontaneous Combustion Control Program and reported on in the AEMR.
78	Bushfire preventative measures include fuel load assessment and reduction programs. • How has/does SponCom contribute to bushfire risk? • At what stage is the mapped current rehabilitation at?	• The nature and location of the spontaneous combustion present at MAC in general is below ground heat and above ground minor smoke. Areas of spontaneous combustion are inspected weekly and managed by sealing the area with inert material (e.g. high clay content earth) and controlled if they present a risk of heat at the surface. • Rehabilitation is mapped annually and reported in the AEMR.
79	Species composition and community structure criteria for targeted vegetation communities. • How do these target conditions relate to approval requirements?	• The target conditions provide criteria specific to each woodland type and meet the requirement for detailed criteria as required by the Project Approval
80	The ARA is undertaken until the area/structure is determined to be relatively stable by an independent expert. • What does 'relatively stable' mean? And what has been the result of previous auditing for this stability?	• The words "relatively stable" are intended to mean that the landform has met design requirements. HVEC agrees that this could be clearer and will amend the wording.
81	• Are pasture areas fertilised? • And to what rates, relative to surrounding land areas? • How does stock carrying capacity compare between rehabilitated and surrounding areas managed similarly e.g., fertiliser rates? • Do any COPC present at levels of concern?	• The intent of the grazing areas is to follow standard practices of pasture and grazing as surrounding areas. Please see Section 10.1.3 of the RMP. • Please see Table 11, Domain – C. Rehabilitation – Pasture. • Fertilizer application is based on soil sampling and is commensurate with good agriculture land practice • Please refer to the recent ACARP Project C23053 Grazing trial for detail on treatments, monitoring and trial results. Stock results on the rehabilitated areas were similar or better in the study. • A further project is currently in discussion with ACARP.

82	"identified and appropriately managed."
	• What does this mean?
	• Does this term provide:
	  ○ direction to BHP staff; and,
	  ○ surety to stakeholders?
		• These are completion criteria which mean that, for the closure of the site, voids and locations (and safety risks associated with those) are required to be identified, and there must be appropriate management of those identified safety risks. Appropriate management refers to management agreed to by the NSW Resource Regulator as sufficient responses to those identified safety risks.
		• The term provides direction to HVEC in meeting the completion criteria, which is subject to the satisfaction of the NSW Resources Regulator. HVEC regularly consults and engages with stakeholders, including as part of the development of completion criteria and this RMP.

83	Actual final void dimensions align with hydrological modeling requirements. • What are these 'dimensions'? • What are these hydrological modelling requirements?	• As shown in Table 11 of the RMP the 2013 EA (specifically Appendix B and C) provide information on voids for surface water and groundwater. • There are 3 Final voids and the dimensions are:

	• What further modelling plans are proposed?	○ Northern Void, surface area 730ha and 281m below ground level ○ Belmont void, 40ha and 28m below ground level ○ McDonald void, 32ha and 57m below ground level These void dimensions will be added to the RMP. • Please see 2013 EA Appendix C, section 6.2 Final Void Model Findings. A final void water balance model was developed for the final void to predict the long-term behaviour of the final void water body (Appendix C). This modelling predicted that final water levels would recover to a level more than approximately 135 m below spill level and no spill would occur from the final void in the long-term (Appendix C). • Further modelling will continue as the mine progresses with current proposed work shown in Table 3 of the FVMP.
84	• Why is carbonaceous material hostile? • What are the assessment criteria?	• Please see RMP, final column of Table 11 “Progress at Start of RMP”. Also geochemistry is discussed in section 7.2.1 of the RMP • The EA documentation Appendix I Geochemistry assessment is available on BHP’s website. Carbonaceous material can have high or low pH and be moderately sodic which can influence plant growth and reproduction.
85	• What long term management impost on the next land user will result from these structures?	• Please see Table 5 of the RMP. Land use is aligned to current and foreseeable future usage of adjoining and regional land.
86	• Why will some dams be backfilled and not removed? • Is backfilling sustainable from an erosion perspective?	• Each dam is assessed for closure individually, so that the most appropriate result for rehabilitation and designated land use is achieved. • Yes backfill is sustainable from an erosion perspective.
87	Contaminated materials removed from site, treated or capped. • Why is the criterion not to meet state requirements for Contaminated Sites?	• The minimum standard is always to meet State and Federal requirements. The approach of using State requirements as a criterion could be used wherever State requirements exist, however in most cases specific criteria are included.
88	What are the closure criteria for the TSF?	• Please see Table 5 of the RMP. • Please see the AFP section 1.2.9. Design by an expert consultant for capping of North Cut Tailings dam is currently underway. The design is being discussed with the NSW Resources Regulator.
89	Ensure geotechnical stability and successful containment of tailings material and hazardous leachate drainage or seepage. • Is ensuring stability desirable? • Is ensuring containment possible?	• Assessment and design by an expert consultant is used for TSF closure. Each TSF will be assessed and stability, erosion and containment addressed on an individual basis and measured against the expert consultant recommendations.
90	Monitoring regime established for downstream waters. • ”Monitoring”. Is not a criterion. It is an approach to achieve a criterion.	• As with all criteria they need to be read in the context of the EA documentation, RMP and Rehabilitation Strategy. • Monitoring requirements can be found in the Groundwater and Surface water monitoring programs which include trigger values. These are reported on in the AEMR annually.
91	Monitoring indicates no evidence of capping instability or environmental harm. • Will monitoring be sufficiently powerful to detect harm? • At what level?	• Assessment and design by an expert consultant is used for TSF closure. Each TSF will be assessed and stability, erosion and containment addressed on an individual basis and measured against the expert consultant recommendations.
92	Sign off from the Dam Safety Committee that TSF wall integrity is satisfactory based on assessment by a suitably qualified geotechnical engineer. • What about long-term erosion?	• Assessment and design by an expert consultant is used for TSF closure. Each TSF will be assessed and stability, erosion and containment addressed on an individual basis and measured against the expert consultant recommendations.
93	Construction of capping layer as per independent consultant’s design, or minimum of 3m capping layer of inert material, • Why would an independent expert design be ignored?	• 3m capping thickness is provided as a minimum. • Assessment and design by an expert consultant is used for TSF closure. Each TSF will be assessed and stability, erosion and containment addressed on an individual basis and measured against the expert consultant recommendations.
94	Monitoring regime established for downstream waters. • Against what criteria?	• Monitoring requirements can be found in the Groundwater and Surface water monitoring programs. These are reported on in the AEMR annually. • For more detail on the Please see 2013 EA Appendix C.
95	Appropriate legal instruments in place to provide long-term protection to onsite biodiversity offset and conservation areas. • What are these instruments, specifically?	• Conservation Agreement under part 4 Division 12 of the National Parks and Wildlife Act 1974. This agreement is between the Minister administering the National Parks and Wildlife Act 1974 (Minister) and Hunter Valley Energy Coal (HVEC) Pty Ltd.
96	Void high walls reshaped to approximately 37 degrees and, if required, protected with berm and trench, or fencing and signage, depending on risk. • Does this angle protect from unacceptable risk? What is this level of acceptable risk?	• Please see the FVMP. The decision framework on page 8 shows how HVEC will address risk. Expert assessment of geotechnical and safety risk will be undertaken to verify that appropriate risk controls are implemented and demonstrate that all reasonable and practicable measures have been applied. • Safety is also discussed in the Rehabilitation Strategy on page 25.
97	Implementation of management measures from hydrological report. • What are these measures? • What residual risk do they result in?	• Please see 2013 EA Appendix C, section 7. Further detail is presented in the Rehabilitation Strategy and FVMP. • The Northern Void is currently identified as a groundwater sink • McDonalds and Belmont voids will be water storages and could provide access to future coal resources.
98	Monitoring indicates no evidence of harmful impact on downstream waters. • What are these receptors (are they known)?	• Yes they are known and can be found in the RMP in Section 7.2.4: Quarry Creek, Whites Creek, Fairford Creek, Ramrod Creek, Hunter River, Saddlers River and downstream users for stock watering and irrigation. These can also be found in, and are discussed in the 2013 EA Appendix C and Section 4.

		• Please refer to the Surface water monitoring program for monitoring associated with the receptors. • Monitoring results are reported in the AEMR.
99	Decommissioned mine water management facilities re-habitated to stable and non-eroding landforms and/ or watercourses. • Why are ”stable and non-eroding" not included as closure criteria?	• These are criteria and are listed in the RMP in Table 5, page 31.
100	Demonstrated long-term stability and function of Hunter River alluvials cut-off wall and flood levy. • What is the time span for “long term”?	• Long term relates to the life of mine. • The function and performance of the wall and levy is assessed annually and reported on in the AEMR.
101	Field monitoring and/or survey data analysis indicates reshaped landforms will continue to shed water, with evidence of unplanned pooling, slumping or accelerated erosion comparable to surrounding non-mined landforms of similar topography. • This is highly undesirable.	• HVEC agrees that this sentence can be worded more effectively and will be changed. • The intent is to state that monitoring will show similar erosion and stability performance to non-mined landforms.
102	”Field monitoring of surface drainage infrastructure demonstrates that constructed drainage features are functioning as designed with no significant failures. • What defines a “significant" failure”? • How long are these structures intended to function for? • With what maintenance? • Who is responsible for long term maintenance?	• Significant failure is one that stops the function of the structure. • The structures are designed to be permanent • Maintenance will be addressed by BHP while the land is owned by BHP. Maintenance post BHP will be dependent on the requirements of future land use and owner, as required by the NSW Resources Regulator.
103	Emplacement outer slopes will generally have an overall slope angle of 10 degrees, and up to a maximum slope of 18 degrees, with DRG approval and appropriate management. • What management is expected? • For how long is management expected?	• Monitoring and subsequent management during mine operation is discussed in section 10.1 of the RMP. • Further monitoring detail is shown in the REMP • Management of rehabilitated areas will be similar to surrounding lands and equivalent land use.
104	Potential/y high risk materials (coarse rejects, potentially acid— generating or spontaneous/y combustible) placed in overburden emplacements will be capped by a minimum of 5m of benign material. • Why this design parameter?	• The recommendation for this design parameter came from the 2013 EA, Appendix I, page 25. The requirement is used to reduce risk of PAF or sodic materials impacting rehabilitation or receptors.
105	Agronomist. • What qualifications certifications should this agronomist possess?	• They should be a certified agronomist. Ideally with experience in grazing and pasture land use within the Hunter Region and agreed by the NSW Resources Regulator.
106	Nutrients. • Which? To what concentrations? • What does “comparable” mean?	• Please see Table 11 page 65 of the RMP. Nutrients are assessed through soil sampling and advice is provided by qualified consultants. Please refer to the recent ACARP Project C23053 Grazing trial for detail on treatments, monitoring and trial results. • Comparable means “similar to”.
107	Soil Carbon, Nitrogen and Phosphorous levels to be comparable with reference sites. • Where are these reference sites? • What nutrient types/fractions?	• Please refer to the recent ACARP Project C23053 Grazing trial for detail. The reference sites were native grassland pastures near the mines within the study. • Nutrients assessed include phosphorus, soil carbon, and nitrogen
108	No gullies greater than 20cm depth over transects. • Why this depth? • At what density besides the, undefined, transect occurrence?	• By addressing shallow gullies early, the erosion can be stopped before causing any major issues. • Locations for gully monitoring are defined by review of aerial photography to target specific areas (Table 4, REMP). Wording will be updated in the RMP to reflect this. Transects for vegetation monitoring done separately, but also provide an opportunistic assessment for erosion.
109	“The total number of native plant species is comparable to the local remnant vegetation.” • Located where?	• Analogue (reference) sites are listed and discussed in appendix 4 of the REMP and shown below in Figure 10 of the RMP. These are reported on annually in the AEMR.
110	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. • This is a leading indicator; not criteria. • Why has this habitat’s performance in attracting/sustaining biodiversity not been included (the outcome)?	• HVEC understand this aligns with the definition of a criterion. However if required it can be changed to a leading indicator. Importantly habitat enhancement is occurring and is being measured and reported on. • Habitat performance criterion is found on page 88 of the RMP within Table 11. “Fauna monitoring indicates patterns of native fauna colonisation and distribution comparable with non-mined native woodland reference sites.” • The performance is monitored as part of the REMP and reported on in the AEMR.
111	Water monitoring indicates no harmful impact on surrounding surface and groundwater. • What are the values (DIIS, 2016d) being monitored for? • At what point in time will they still be acceptable i.e., long term water quality and associated risk?	• The list of surface water values can be found in the Surface Water Monitoring Program. • The list of groundwater values can be found in the Groundwater Monitoring Program. • The monitoring is currently set up for life of mine. The monitoring programs are reviewed annually and are updated if required through review by Government and through improvements by HVEC. Monitoring post closure will be subject to review and approval by the NSW Resources Regulator at that time through the Annual Forward Program process.
112	Review proposed post-mining void use to determine whether still achievable, and identify long-term management measures. • Of concern, this risk “management” seems to simply reduce expectations for outcomes.	• The current void options of ground water sink, and water storage are unlikely to be affected by a wall failure. However other options such as future coal mining could be impacted for viability. • Void use options/outcomes are being reviewed and MSC will be included in the discussion.

113	Identify remedial strategy that mitigates and makes safe the immediate failed area, addresses all associated impacts (i.e. reduced void storage capacity, water quality impacts). • Has planning identified likely impacts to ensure that they can indeed be acceptably addressed? Otherwise, this statement is merely a strategy to come up with a strategy.	• HVEC agrees 'plan' is a better word than 'strategy' in this case and HVEC will make this amendment. • The remedial strategy referred to would address immediate failure and downstream impacts, improve up-catchment infiltration and or drainage diversion.
114	Ecosystem processes (i.e. reproduction, nitrogen fixing and nutrient recycling) not re-established, leading to sterile unsustainable ecosystem. • Will monitoring programs measure each of these parameters?	• Yes. The REMP outlines monitoring requirements, the EDMP and Grazing trial discuss the results. Furthermore ongoing monitoring is reported in the AEMR annually.
115	Release of leachate/contaminants from mined materials/ waste material requiring long-term management or treatment. • Will monitoring of aquatic biota occur (acute and also for body burdens)?	• Yes monitoring of aquatic biota would occur if this issue occurred. The current Surface Water Monitoring Program has trigger levels. Specific testing will be dependent on expert consultant recommendations and approval by the NSW Resources Regulator.
116	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. • What impacts are predicted? • What management actions are expected to resolve these?	• Impacts are water quality impacts water dependent aquatic or terrestrial ecosystem function and or downstream users. Please refer to the Groundwater and Surface Water Response Plan Table 1 for additional detail. • The management action process is - An investigation will be undertaken in consultation with DP&E and any other relevant department and will involve the consideration of a visual inspection: a) site activities being undertaken at the time; b) baseline surface water and groundwater monitoring results; c) surface water and groundwater results in nearby locations; d) the prevailing and preceding meteorological conditions; e) hydrological conditions; and f) changes to the land use/activities being undertaken in the contributing catchment or hydrogeological regime.
117	Unexpected contaminated land, leading to costly treatment and disposal, and delayed relinquishment. • Will contaminated pit lake water also trigger Contaminated Sites legislation?	• In NSW, contamination can be regulated under the *Contaminated Land Management Act 1997* where the EPA considers that it is significant enough to require regulation. Contamination must also be considered in the planning and development process in accordance with State Environmental Planning Policy No. 55 - Remediation of Land and the Managing Land Contamination - Planning Guidelines.
118	If required, the decommissioning, rehabilitation and final-use strategies for final voids should also be reviewed to determine ongoing suitability. • How can this review be achieved when final-uses are undefined?	• The void uses are defined: Northern void a groundwater sink, McDonalds and Belmont voids as water storage. Alternative uses will continue to be reviewed as part of the FVMP. These uses will be discussed with MSC.
References	Why have key state e.g., (NSW DT&I; 2014); Commonwealth e.g.; (AusIMM; 2012; DIIS, 2016a, b, c; d; f; g) and international e.g., (ANCOLD, 2012; INAP, 2014; APEC, 2018; ICMM, 2019) guidance not formed part of the development of this RMP?	• The NSW Resource Regulator has provided guidelines which have taken into consideration other key state, national and international standards and guidance. HVEC have followed the NSW Resources Regulator Guidance.
119	Section 1.2.1 Exploration: it is difficult to accept that an "Envirovibe" seismic survey" does not result in any environmental impact". Will seismic survey be restricted to areas that don't contain native vegetation?	• HVEC agree there is minor environmental impact and will change the wording to = 'non-invasive impact' similar to a farm vehicle driving through a paddock. As discussed in the AFP the use of this survey type is the lowest impact method available.
120	Section 1.2.2 Construction: note among the intended constructions: a. "The Edderton Road construction pad, currently located adjacent to the Windmill/Huon Pit high wall; will be relocated to the South. A new access road off Edderton Road will be constructed to service this pad." (emphasis added). This is a matter for Council 's approval. b. "The approved realignment of Edderton Road and its intersection with Denman Road, which includes the extension of the existing alluvial cut off wall, the relocation of power lines, water infrastructure and the construction of water/sedimentation dams. " • The realignment is not approved; the realignment project is subject to a deed entered into by MSC and HVEC.	• The realignment of Edderton Rd to the satisfaction of Council and RMS is required by Condition 47(d) of the Project Approval. MSC and HVEC have entered into a deed which relates to the obligation set out in Condition 47(d).
121	Section 2.1: Council reiterates its concerns with the Rehabilitation Strategy and refers BHP to submissions made in respect of the Rehabilitation Strategy most recently purportedly approved by the Secretary.	• Council's challenge to the Secretary's approval of the Rehabilitation Strategy was unsuccessful at first instance and is currently the subject of an appeal by Council to the Court of Appeal. Council has received HVEC's submissions in the appeal and we do not propose to restate these arguments here.
122	Section 2.2: The Rehabilitation Schedule should contain more precision and specific timeframes for the completion of each rehabilitation activity with a mechanism accounting for unforeseen circumstances that affect the original schedule. The document purports to be a "program" and Section 2.2 purports to set out a "schedule" but the document merely sets out a series of aspirations or objectives. This does not meet the plain meaning of the words "program" and "schedule", and also the rehabilitation regime mandated by the terms of the Modified Project Approval.	• The schedule activities and timeframes are appropriate for the duration and type of the activities. Many of the activities are recurring. The TARP (Table 12) within the RMP discusses management actions where outcomes are not being achieved.
123	There is no scheduling or mention of designing the emplacements to incorporate natural micro-relief and natural drainage lines. The existing emplacements which have not been so designed and constructed must be ameliorated to satisfy the requirements of the Modified Project Approval	• Plans 2a, b and c show the location for the planned emplacements. The overall design for the site can be found in the Rehabilitation Strategy Figure 11. • Consistent with its position in the appeal proceedings brought by Council, HVEC does not consider that the Modified Project Approval requires the disturbance of areas of existing rehabilitation. This was the finding of the Land and Environment Court and is currently the subject of an appeal by Council to the Court of Appeal. Council has received HVEC's submissions in the appeal on the proper construction of the Modified Project Approval and we do not propose to restate those arguments here.

124	The maps containing the disturbance forecasts for each of the relevant years fail to identify the emplacement areas by boundary or even general location. • These must be identified on the maps — it is impossible to program rehabilitation activities for forward years without the identification of emplacements existing or to be designed and constructed on the mine site.	• Boundaries of the mine domains including emplacement areas with rehabilitation and those yet to be rehabilitated are clearly defined on the figures 2a, b, c and are shown in the legend. As discussed above void labels will be added.
125	An additional rehabilitation phase should be listed, being the temporary rehabilitation phase, to achieve requirements to take all reasonable steps to be to minimise the total area exposed at any time. This may mean interim stabilisation and temporary vegetation strategies are required in locations not ready for permanent rehabilitation. The long and on-going dry conditions, and the steep slopes of temporary emplacement material stockpiles, have contributed to dust generation from mine sites, particularly on windy days. There is insufficient info on this issue in the draft MOP.	• Temporary stabilisation is not considered a rehabilitation phase. Section 2.4 of the AFP discusses the use of temporary stabilisation including aerial seeding of approximately 600Ha over the AFP period. Further investigation into alternate stabilisation options is being assessed as per Table 2.

126	Fill erosion gullies at VD1 (FY17 rehabilitation) to the landform design surface.
	• Is there an understanding as to how this gully formed under the previous landform design?
	• Is there a significant risk of gully formation in similarly designed landforms?
	• How will the repair work be undertaken to achieve;
	  ○ natural waterflow; and,
	  ○ sustainable and non-eroding flow?
		• The gully formed due to lack of surface vegetation cover from the newly seeded area. Seed did not germinate due to lack of rain.
		• This and other new rehabilitation areas will be treated with mulch or another interim cover while vegetation establishes.
		• The area will be repaired to the design requirements. E.g. where no vegetation has established on recent rehabilitation, deep rip to create a seedbed and re-sow seed with fertilizer and add a mulch or similar for ground cover.

127	Construct rock lined waterways at VD1 (FY17 rehab) with trapezoidal cross-sections that capture, contain and control concentrated water flows. • How do these designs reflect natural analogous waterways?	• Design method chosen is an adaptation of the Geofluv™ approach, 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. • Please refer to the Rehabilitation Strategy Section 6.3 for more information.
128	A significant amount of fertiliser and gypsum is to be applied to VD1 based on the soil assessment. • Why were these ameliorants required? • Is there a significant need for ameliorants in similarly designed landforms?	• Ameliorants were required based on soil sampling. Specifically Gypsum has been used at 10 t/ha which reduces the sodicity of the soil assisting with both reducing soil dispersion and improving plant growth. • All landforms are tested for ameliorant requirements and due to the nature of the top soil and subsoil in the Hunter Valley, the areas to be rehabilitated will require ameliorants.
129	Fill erosion gullies at MacDonald's to the landform design surface and fill erosion gullies at MacDonald's Void (2000 rehabilitation) to the landform design surface. • Is there an understanding as to how these gullies formed under the previous landform design?	• In this case a contour bank without sufficient ground cover was the point of failure.
130	There is a disparity in disturbance to progressive rehabilitation in that the actively disturbed area is expected to grow 387 (ha, presumably, no units are given) over the AFP period. However, Rehabilitation Land Preparation is only expected to grow by 32 ha. Given the large amount of disturbed land at the project, and the long-time duration for woodland rehabilitation to complete, there is a significant need to reduce this backlog of disturbed land and have more disturbed land progressively rehabilitated,	• HVEC will add units of hectares (ha). • As discussed in section 4.2 of the AFP, rehabilitation can only occur on completed emplacement areas. The eastern and southern areas of the main emplacement are not available for rehabilitation consistently in the near term due to the size and height of the final dump and the time to take to reach its outer limits. The tailings dam is also a hard constraint on the eastern perimeter of the mine. Additionally, the two south west out of pit emplacements are being placed in a way that will maximise rehabilitation and minimise the amount of time an open face would be visible from off the mine site (south west direction).

	There is high detail for some elements of rehabilitation, such as soil conservation and pasture revegetation; yet other elements of rehabilitation, which might contribute to significant liability e.g., voids, are left almost entirely unaddressed. Critical gaps in rehabilitation guidance pertain to aquatic habitats; both the pit lakes and also diverted or otherwise impacted creek lines. Little detail is presented on what the closure objectives will be, or how they will be measured. Monitoring is often proposed as a closure criterion. What and how long to monitor for are also key omissions.	• The Rehabilitation Strategy provides discussion on Voids and the FVMP provides additional detail including current approved final void use.
		• The FVMP commits to further improvements on gaps in the final void rehabilitation.
		• HVEC agree more can be done to enhance the content of aquatic habitat rehabilitation in the RMP.
		• As stated in the BMP Section 11.3.3 Surface Water Monitoring Program MAC-ENC-PRO-061 describes the surface water monitoring activities undertaken. The purpose of the program is to manage hydrological impacts of mining on the local and regional surface water systems. This includes:
		  ○ Surface water flows to measure impacts on local and regional surface water hydrology;
		  ○ Riparian and in-stream vegetation and channel stability to assess potential impacts on stream health which is undertaken on an annual basis; and Surface water quality.
		  ○ The program covers receiving environment water management systems including creeks potentially impacted by operations.
		• As stated in the BMP Section 11.3.3 it is intended that creek diversions and realignments will be rehabilitated to:
		  ○ Mimic predevelopment flows for all flood events up to and including the 1 in 100year ARI;
		  ○ Incorporate erosion control measures based on vegetation and engineering revetments;
		  ○ Incorporate structures for aquatic habitat (including geomorphic and vegetation); and
		  ○ Revegetate with suitable native species.
		• As stated in the BMP Section 11.3.3 HVEC 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;
		  ○ Develop design for creek reinstatement, replacement and or offsets; and

		○ Develop a program for execution of creek reinstatement replacement and or offsets. • A study on creek reinstatement will be commenced in FY20 with the results updated to the RMP as shown above. • Table 5 of the RMP describes objectives and criteria for all domains. • Current monitoring is proposed for life of mine and would continue post closure until other arrangements, if required and as approved by the NSW Resources Regulator for a modified post closure monitoring program are implemented.

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6 June 2019

Howard Reed
Director Resource Assessments
Department Planning and Environment
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Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear Howard,

Hunter Valley Energy Coal Pty Ltd (HVEC) will be submitting an amendment of the Mine Operations Plan (MOP) for the Period FY20 – FY22 (July 2019 – June 2022) to the Resources Regulator. The MOP similarly satisfies the requirement of Condition 44 of the Project Approval No. 09_0062 (as modified on 26 September 2014) (Project Approval) for a Rehabilitation Management Plan. We are pleased to provide the amended MOP and associated plans to maintain communication and updates regarding mining activities at Mt Arthur Coal.

The format of the MOP has been updated to align with the draft Rehabilitation Guidelines released by the NSW Resources Regulator. This means there are now two main sections for this MOP submission. Section 1 aligns to the Guidelines for Code of Practice Annual Rehabilitation Report and Forward Program for Large Mines. Section 2 aligns to the Code of Practice: Rehabilitation Management Plan for Large Mines.

The MOP amendment documentation includes:

- Mt Arthur Coal Annual Forward Program FY20, FY21 & FY22;
- Mt Arthur Coal Rehabilitation Management Plan (five year duration).

Rehabilitation Management Plan Amendment Scope
The RMP format has been modified to align with the Code of Practice: Rehabilitation Management Plan. The content of the RMP is largely unchanged other than additional information in Sections 9 and 10 for quality control and monitoring respectively and Section 11 for Rehabilitation research and trials. The RMP duration is for a five year period. The RMP is not expected to change much over time but will require updates from time to time with changes to rehabilitation processes.

Annual Forward Program Amendment Scope
The Annual Forward Program (AFP) disturbance is located within the Mt Arthur Coal Project Approval Project 09_0062 MOD 1 (Project Approval) extent of approved surface development (Ancillary Disturbance Boundary) Furthermore, the AFP is aligned with the Conditions and Environmental Assessment of the Project Approval.

The changes proposed for the AFP have arisen due to identification of opportunities for increasing the efficiency of current operations. The opportunity assessment is undertaken on an annual basis and recent assessment has identified areas for rehabilitation, overburden and mining not currently in the FY18-FY20 MOP. These options were already considered as identified within the Project Approval, and have been assessed for community and environmental aspects.

Rehabilitation progression
As discussed in our meeting on the 21 may 2019, MAC dig and dump has been constrained at the northern end. As a result this has slowed the advancement of the northern emplacement and pushed mining intensity to the southern areas of the main pit. Over the past two years, MAC has been through a comprehensive opportunity assessment to determine the most effective plan for rehabilitation and mining to deal with this constraint. The most recent inclusion is the main pit realignment to reduce the obtuse angle between the endwall (north) and advancing highwall to transition back to 90 degrees. By

doing this, the northern emplacement adjacent to Denman Road will be accelerated and rehabilitation will be released more consistently across the years.
The eastern and southern areas of the main emplacement are not available for rehabilitation consistently in the near term due to the size and height of the final dump and the time to take to reach its outer limits. The tailings dam is also a hard constraint on the eastern perimeter of the mine.
Additionally, the two south west out of pit emplacements are being placed in a way that will maximise rehabilitation and minimise the amount of time an open face would be visible from off the mine site (south west direction).
Temporary stabilisation activities proposed for this AFP period 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. Approximately 600 ha of aerial seeding is proposed during the three year AFP period for temporary stabilisation.
Discussion is encouraged on all aspects of rehabilitation in the MOP (AFP and RMP).

Management Plans
No updates will be required to any other management plans, as no significant additional changes are expected to result from the proposed updates. HVEC will also be discussing the amendment with other stakeholders before submission to the NSW Resources Regulator.

Please reply in writing to this letter by 24 June 2019 with any questions or comments regarding the specified MOP amendment, so that we can appropriately address these, and that we can provide correspondence to the NSW Resources Regulator along with the MOP submission.

Please do not hesitate to contact me on 0429186152 or at luke.l.neil@bhp.com.

Regards,

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Principal Environment Analysis and Improvement
BHP Minerals Australia

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15 July 2019

Howard Reed
Director Resource Assessments
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Mt Arthur Coal Mine Operations Plan FY20 – FY22:

Dear Howard,

Hunter Valley Energy Coal Pty Ltd (HVEC) will be submitting an amendment of the Mine Operations Plan (MOP) for the Period FY20 – FY22 (July 2019 – June 2022) to the Resources Regulator. The MOP similarly satisfies the requirement of Condition 44 of the Project Approval No. 09_0062 (as modified on 26 September 2014) (Project Approval) for a Rehabilitation Management Plan.

We are pleased to provide the comments below in response to your letter entitled "Mount Arthur Coal Mine (09_0062) Rehabilitation Management Plan" and dated 5 July 2019. Also comments in response to the Resources Regulator for your information have been included in Tables 1 Rehabilitation Management Plan and Table 2 Forward Program below.

HVEC will continue to work with DPE to update and improve the Rehabilitation documentation and processes.

Please do not hesitate to contact me on 0429186152 or at luke.l.neil@bhp.com.

Regards,

Luke Neil
Principal Environment Analysis and Improvement
BHP Minerals Australia

Table 1. Rehabilitation Management Plan comments

DPE Resource Regulator Comment on RMP	BHP Response
Risk Assessment	
Current draft RA refers to project environmental risk assessment for EIS. Proposed new mining lease conditions require a *specific rehabilitation risk assessment* to be carried out for each RMP submission, and records to be maintained to demonstrate compliance.	The Project Approval Risk assessment is still a valid risk assessment and does capture the main rehabilitation risks. Risk assessments are also done annually at MAC and are available on request. The risk assessment domain and controls are shown in table 11 and align with table 12 TARP section of the RMP.
There must be clear linkage between identification of unwanted risk events / controls / rehab implementation discussion. Mandatory requirement of the Code is to present in a table risks and controls. Current text sections in the	The rehabilitation risks are all discussed in the RMP, but HVEC agree they can be moved into a table to make the risk and control links simpler to read. HVEC

MAC RMP is unnecessary, particularly text referring to other management plans.	propose to develop a suitable table for the next revision of the RMP in consultation with DPE.
Guidance for the scope of the risk assessment and appropriate controls to be included in the required table are provided in *Guideline: Rehabilitation Risk Assessment* and *Guideline: Controls*	Noted by HVEC
Rehabilitation Objectives and Completion Criteria	
Text in section 5.1.1 - 5.1.3 is all unnecessary. (We should consider how we 'influence' industry to strip this kind of 'MOP' content out of the RMP). The mandatory requirement is to provide only the RO &CCs in a table.	HVEC agree and will reduce this content. Some of the criteria and objectives were added in specifically at request by DPE as required in the last revision of the Rehabilitation Strategy. HVEC agree that there is an opportunity to make some of these more quantitative. This will take more than a few days to change, so we propose to update for the next version.
RO&CC do not comply with SMART criteria as per examples in Appendix 2. CC are mostly generic and not quantifiable. There appears to be a misunderstanding regarding the definition of CC and indicators. Below is an explanation you can provide MAC and examples I have written using info that is actually in sections of the MAC RMP. REHABILITATION OBJECTIVES that describe the desired features and/or characteristics of the final land use domain INDICATORS that are specific attribute associated with the objective COMPLETION CRITERIA (benchmark for the indicator, based on analogue data where appropriate) VALIDATION METHOD such as monitoring, engineer report , survey	HVEC used the template provided by the Resource Regulator about 18 months ago for the objectives and criteria. It sounds like remodelling Table 11 to align with the definitions to the left would help meet the SMART criteria. HVEC will develop an updated SMART criteria in consultation with the Department for addition to the next version of the RMP.
DPE Resource Assessments Comment on RMP	**BHP Response**
The Department considers that the Rehabilitation Management Plan would benefit from further description of the measures to be implemented to integrate Biodiversity Offset Areas with rehabilitated woodland communities, particularly at the boundaries between these two areas.	The BMP is a more suitable document for this content, and which currently states the following: Integration of the offset strategy and rehabilitation areas will be achieved through the design of woodland corridors which will directly link vegetation in Thomas Mitchell Drive Offset Areas, Mt Arthur Offset Area, Saddlers Creek Offset Area and Edderton Road Revegetation Area (Figure 1). These woodland corridors will also link offset areas to remnant woodland areas to east of the MAC Complex, including the Drayton Wildlife Refuge (located to the north of Thomas Mitchell Drive and Drayton Coal Mine). • Revegetation; • Weed control; • Pest animal monitoring and control; • Fire management; • Fencing; and • Monitoring and reporting.
The Department notes that the Annual Rapid Assessment (ARA) is due within 3-6 months of rehabilitation establishment. Please clarify the definition of "rehabilitation establishment", in order to make it clear when each ARA is due.	Rehabilitation establishment should be ecosystem establishment phase and in this case means post seeding. HVEC will update in the RMP
The Department notes the company's rehabilitation monitoring program (Section 9) and use of an ARA. The Department considers it would	Monitoring is conducted annually, which is stated in section 10 of the RMP.

be beneficial to provide timeframes and actions that constitute monitoring established rehabilitation and an overview of the characteristics that constitute post-rainfall event inspections.	Also shown in the RMP below are the characteristics monitored: • Effectiveness of contours (if present); • Identification and evaluation of any area of active/potential erosion; and, • Rapid assessment of newly established rehab for groundcover percentage to determine if future monitoring is required under this program
The Department notes the proposed research includes rehabilitation monitoring, as mentioned in Section 11.1. Please identify the expected commencement/completion dates, in relation to current and future rehabilitation trials.	This has been updated. Monitoring of the rehabilitation progress through the phases has been ongoing at MAC. The Monitoring is proposed to be increased and expanded as the rehabilitation increases across site. MAC is working with a consultant to update and improve the monitoring across MAC. The monitoring improvements will be available in the next version of the RMP, proposed for update by 30 June 2020.
Please provide higher resolution figures for Figures 7 and 8	Updated figures in final RMP version

Table. 2 Forward Program Comments

DPE Resource Regulator Comment on Forward Program	**BHP Response**
General: MAC appear to have just provided the components of a Forward program that describe forecast rehab as per the current MOP section 7. The forward program entirely omits: 1. Rehab planning (further development of closure planning, any stakeholder consultation etc) 2. Rehab trials and research programs	Section 2.1 shows what rehabilitation activities are planned. Rehab trials and research programs are shown in the RMP as required by the draft RMP guidelines provided to HVEC. ? Stakeholder consultation is attached to the RMP including HVEC responses.
Feedback for site is that following implementation these sections should be included and aligned to the RMP LoM Rehab Schedule so that RR can assess adequacy of planning activities to meet progressive rehab commitments for the project.	A rehabilitation schedule is provided in Figure 9 of the RMP. The Planned activities for rehabilitation are listed in the rehabilitation schedule section of the Forward Program.
S2.2 Table 2. is a very clear and succinct summary of rehab maintenance activities. Going forward it could be improved by linking the actions to monitoring reports/QA inspection recommendations, and indicating if any actions are triggered from TARP thresholds to improve transparency regarding the decision making processes behind the nominated actions.	Currently the annual monitoring generates recommendations for stability, erosion and flora and fauna, and these are added to the rehabilitation schedule. The monitoring is reported on in the AEMR. HVEC is working with a consultant to improve the reporting link to the criteria and TARP and this improvement will be added to the next version of the RMP
Plans and rehab stats do not comply with the Code however this will be addressed by amending the data submission as per Will's comments below	Noted by HVEC
Spatial Data Submission	
Disturbance – DistYr (Disturbance Year) should be the year that disturbance first occurred within that polygon area. This is particularly important for the KPI report as it is picking up that there was over 7000 hectares of disturbance in 2019 as all polygons have a disturbance year of 2019	To be updated to the portal
Forecast Themes – Currently supplied as total disturbance plus forecast disturbance. This is not correct. Forecast data should reflect forecast new areas of Disturbance, Land Prepared for Rehabilitation and Ecosystem and Land Use Establishment. These polygons should only show planned new areas under these three categories	HVEC will update to the portal.

i.e does not include existing disturbance areas. Updates have been made to the guidelines to make the expectation clearer, as below. Note: we will be removing the word (Total) from Forecast disturbance as this is misleading. ○ Forecast Disturbance (total) ▪ This is the new disturbance areas for the forecast year i.e. land/vegetation clearing etc. ○ Forecast Land Prepared for Rehabilitation ▪ Areas where works are planned be undertaken in the following rehabilitation phases: Decommissioning, Landform Establishment, and Growth Media Development. ○ Ecosystem and Land Use Establishment ▪ Areas where works are planned be undertaken in the following rehabilitation phases: Ecosystem and land use establishment i.e. vegetation establishment (seedling/planting) initiated.	
• Rehabilitation – No issues • Final Land Use – No issues • Final Landform Contours – No issues	Noted
DPE Resource Assessments Comment RMP	**BHP Response**
The Department notes the estimated completion dates included within Table 2 (Section 2.2). The Department considers it would be beneficial to provide the frequency, estimated duration and completion dates for all proposed activities.	The schedule is deliberately designed to allow some flexibility in the finish date due mostly for weather, but also due to actual finish date for shaping of emplacements and availability of machinery. Considering the large scale and nature of the rehab these date ranges are suitable. Hovever HVEC will work with RR to improve for the next version of the Forward Program.
Please identify the units of measurements in Tables 3 and 4.	Hectares added to the table