



**WAMBO COAL
MINING OPERATIONS PLAN
2018 – 2020**

Prepared by Wambo Coal Pty Ltd
Document No. WCPL_MOP_2018-2020
December 2017

Wambo Coal Pty Limited

Mining Operations Plan

Name of Mine: Wambo Coal Pty Ltd
MOP Commencement Date: 1 January 2018
MOP Completion Date: 31 December 2020
Mining Authorisations (Lease / Licence No.): CL397, CCL743, CL374, CL365, ML1402, ML1594, ML1572.

Name of Authorisation/Title Holder(s): Wambo Coal Pty Ltd

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Date: 22/12/2017

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Document Control

Document No.	WCPL_MOP_2015-2020
Title	Wambo Coal Mining Operations Plan (2018 – 2020)
General Description	Mining Operations Plan (MOP)
Key Support Documents	South Bates (Wambo Seam) Underground Mine Modification (MOD15) South Wambo Underground Mine Modification (MOD12) SBU Extraction Plan LW11-16 South Bates Extension Modification Environmental Assessment (MOD17) Wambo Coal Environmental Management System Development Consent – DA 305-7-2003

Revisions

Rev No	Date	Description	By	Checked
A	December 2017	Original Draft	WCPL	Steven Peart

The nominated Coordinator for this document is	Environment and Community Manager
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Appendix 2 DA 305-7-2003

Appendix 3 Surface Disturbance Permit

1.0 Introduction

This Mining Operations Plan (this MOP) for both the Open Cut and Underground Operations has been prepared by Wambo Coal Pty Ltd (WCPL) (the Mine), to satisfy conditions and the requirements of:

- ML 1402, ML 1572, ML 1594, CL 365, CL 374, CL 397 and CCL 743;
- DA 305-7-2003 & DA 177-8-2004; and
- ESG3: Mining Operations Plan Guidelines¹, September 2013 (here within referred to the *MOP Guidelines*).

The Mine is an open cut and underground coal mining operation located approximately 15 kilometres west of Singleton, near the village of Warkworth, New South Wales (**Figure 1**). The Mine is owned by WCPL, a subsidiary owned by Peabody Energy Australia Pty Ltd (Peabody-75%) and Sumiseki Materials Co Ltd (Sumiseki-25%). Open cut and underground mining, coal processing and other associated activities at the Mine are undertaken by WCPL. A recent aerial photograph of the Mine illustrating the existing and approved extent of open pits, underground mine plans and infrastructure is shown on **Figure 2**. Thermal coal products from the Mine are transported by rail to domestic customers for use in electricity generation and to port for export.

The Mine is bounded by the Wollombi Brook to the east, coal mining operations to the north and east, grazing land to the south and north-west and the Wollemi National Park to the west (**Plan 1A** and **Figure 1**). Land use in the vicinity of the Mine is a combination of coal mining operations, conservation areas, National Parks, agriculture and rural residential development.

The Department of Planning & Environment (DP&E) on the 4 May 2015 provided comment that an approved MOP will satisfy Condition 94C, Schedule 3 of DA 305-7-2003 for a preparation of a Rehabilitation Management Plan (RMP). Information on the requirements for an RMP and where the requirements are addressed in this MOP are provided in **Section 1.3**.

1.1 History of Operations

The Mine was originally granted development consent by Patrick Plains Shire Council in 1969. Subsequent development consents issued in 1972, 1974 and 1977 covered a range of early open cut and underground operations, while activities such as the construction of office buildings, bathhouses, the Homestead Underground Mine coal conveyor, Hales Crossing on Wollombi Brook, extensions to mining operations and modifications to road haulage rates were consented by Singleton Shire Council (SSC) between 1980 and 1991.

In July 1991, DA 108/91 was lodged with the SSC seeking approval for the expansion of open cut and underground mining activities at the WCPL and the consolidation of earlier development consents. Development consent for DA108/91 was granted in February 1992, approving the production of up to 3 million tonnes per annum (Mtpa) of saleable product coal over a 21 year period. Subsequent modifications to DA 108/91 have included the Wollemi Underground Mine box cut, coal transportation, tailings deposition, coal conveyor, underground borehole pumps, stockpile area and haul road for coal haulage. Subsequent to the grant of Development Consent DA 108/91 (SSC, 1992), open cut mining operations were conducted from 1993 until closure in March 1999. Open cut operations recommenced in August 2001 at a rate of 1 Mtpa of ROM coal.

¹ ESG3: Mining Operations Plan Guidelines, September 2013 issued by the NSW Trade & Investment – Division of Resources and Energy. This obligation to prepare a MOP derives from Condition 2 of CL374, Condition 3 of CCL743, Condition 3 of ML1402, Condition 2 of ML1572 and Condition 2 of ML1594.

Figure 1 Locality Plan

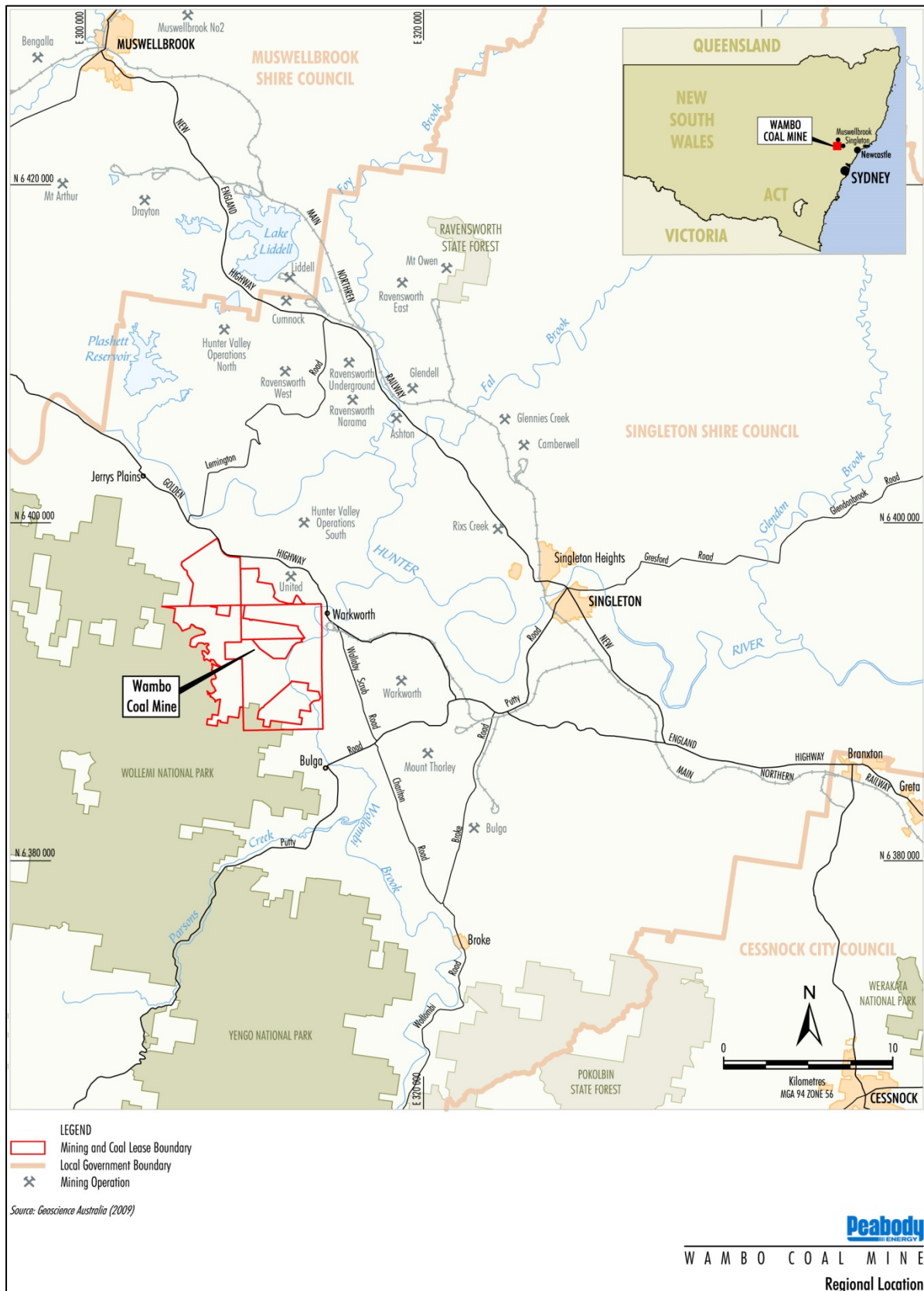
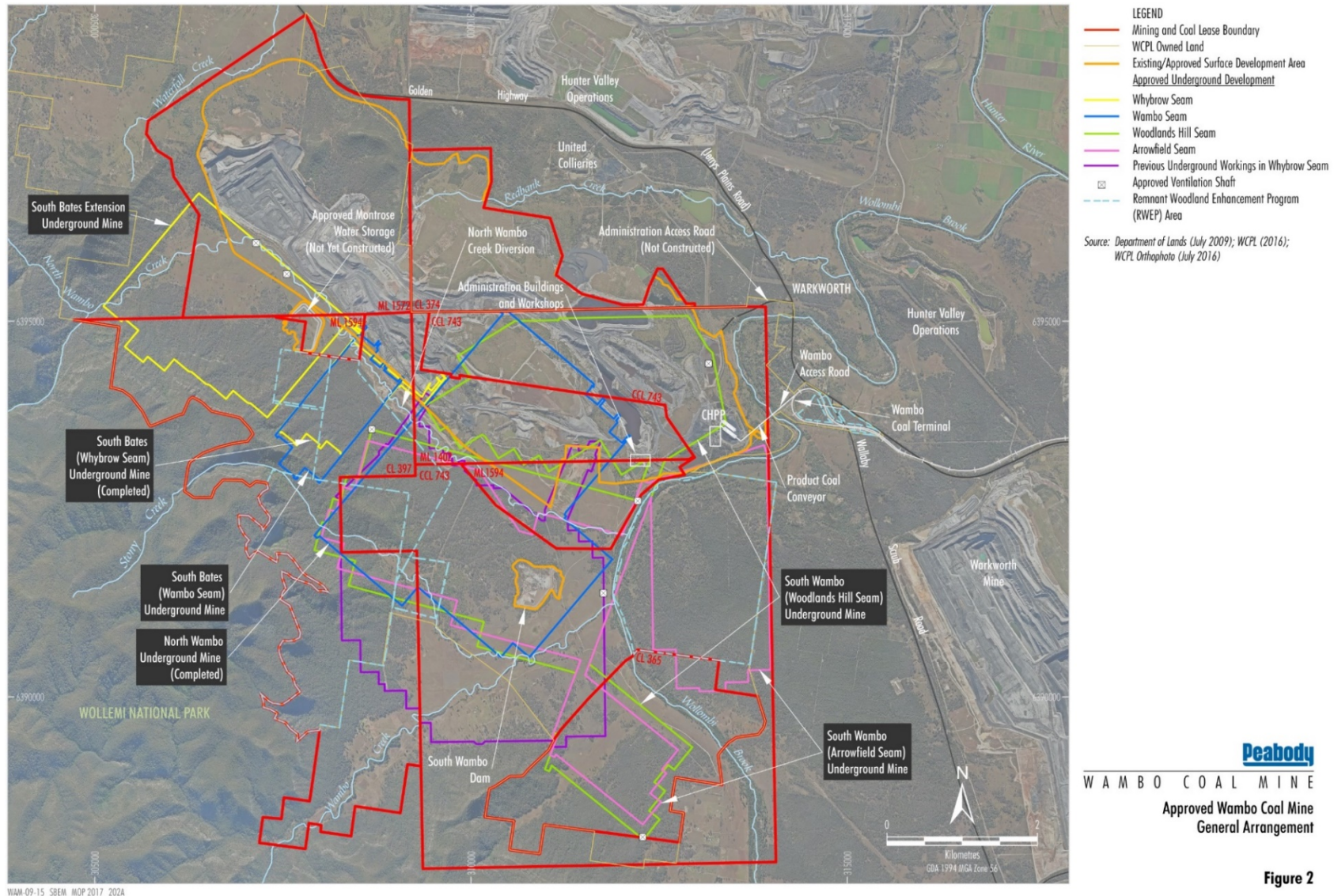


Figure 2 Wambo Coal Mine General Arrangement



Peabody
WAMBO COAL MINE
Approved Wambo Coal Mine
General Arrangement

Figure 2

Underground mining operations at the Homestead Underground Mine commenced in 1979 and ceased in 1999. The Wollemi Underground Mine commenced in 1997 and produced in the order of 3 million tonnes (Mt) of ROM coal during the 2001/2002 financial year, prior to the cessation of mining activities. The Wollemi Underground was placed on care and maintenance in October 2002. Following the cessation of underground operations in 2002, open cut operations were subsequently expanded to maintain an overall production rate at 4 Mtpa of ROM coal.

Following submission of the Wambo Development Project Environmental Impact Statement (the Project EIS) in July 2003, WCPL was granted development consent in February 2004 (DA 305-7-2003) which enables the expansion of the current open cut operations and development of additional underground mining operations. The approved development described in the Project EIS and subsequent modifications extends the mine life until 31 December 2039³ and allows ROM coal production up to 14.7 million tonnes per annum (Mtpa). For a summary of all modifications please refer to **Section 1.3**.

The Project EIS also addressed a separate development application (DA) for a rail spur and loop, coal reclaim and rail loading facilities for the Wambo Coal Terminal. Consent for this development (DA 177-8-2004) was granted in December 2004. The Wambo Coal Terminal was commissioned in May 2006 and allows the transport of all product coal from the WCPL by rail to the Port of Newcastle.

A copy of DA305-7-2003 (as modified) is provided in **Appendix 2** and on the Peabody website (<https://www.peabodyenergy.com/Operations/Australia-Mining/New-South-Wales-Mining/Wambo-Approvals,-Plans-Reports>).

All mining and associated activities are now undertaken by WCPL since the transition to an owner-operator operation was completed in April 2013. Approved run-of-mine (ROM) coal production at the Mine is 14.7 Mtpa. ROM coal is either washed at the Coal Handling and Preparation Plant (CHPP), or where in specification, by-passed to the product stockpile, and then loaded onto trains via the train loading infrastructure. All product and domestic coal is transported by rail, with product coal to the Port of Newcastle for export markets.

In accordance with Condition 5, Schedule 2 of the DA305-7-2003, mining operations may be undertaken on the site until 31 December 2039². A summary of the approved Wambo Coal Mine is provided in **Table 1**. A summary of the approval history since the granting of DA305-7-2003 is provided in **Table 3** of this MOP.

1.1.1 Relationship with Previous MOP

WCPL previously operated under two separate Mining Operations Plans (MOPs) for the underground and open cut mining operations.

In late 2014 and early 2015, a revised MOP was developed in accordance with the *MOP Guidelines* to include all proposed open cut and underground mining and mining associated activities at the Wambo Coal Mine. The MOP was approved with a term of 5 years and an expiry date of 30 March 2020. This MOP was subsequently amended on six occasions.

Once approved, this MOP will supersede and replace the 2015-2020 MOP. This MOP has been prepared to incorporate the changes proposed as part of Modification 17 (MOD 17) to DA 305-7-2003. It also incorporates remediation activities on the Kharlibe property and some minor changes to scheduling of open cut mining activities.

In accordance with the definition as provided in the *MOP Guidelines*, Wambo Coal Mine is classified as a Level 1 Mine.

² As approved by MOD 17.

Table 1 Summary of the Approved Wambo Coal Mine

Component	Approved WCPL ¹
Life of Mine	<ul style="list-style-type: none"> 35 years (until 31 December 2039).
Open Cut Mining	<ul style="list-style-type: none"> Open cut mining at a rate of up to 8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal from the Whybrow, Redbank Creek, Wambo and Whynot Seams.
	<ul style="list-style-type: none"> An estimated total open cut ROM coal reserve of 98 million tonnes (Mt).
	<ul style="list-style-type: none"> Open cut mining operations up to and including 2020.
Underground Mining	<ul style="list-style-type: none"> Underground mining of up to 9.75 Mtpa of ROM coal from the Whybrow, Wambo, Woodlands Hill and Arrowfield Seams.
	<ul style="list-style-type: none"> Underground ROM coal reserves are estimated at 161.3 Mt.
Subsidence commitments and management.	<ul style="list-style-type: none"> The subsidence impact performance measures listed in Conditions 22 and 22A, Schedule 4 of the Development Consent (DA 305-7-2003).
ROM Coal Production Rate	<ul style="list-style-type: none"> Up to 14.7 Mtpa of ROM coal.
Total ROM Coal Mined	<ul style="list-style-type: none"> 259.3 Mt.
Waste Rock Management	<ul style="list-style-type: none"> Waste rock deposited in open cut voids and in waste rock emplacements adjacent open cut operations.
Total Waste Rock	<ul style="list-style-type: none"> 640 million bank cubic metres.
Coal Washing	<ul style="list-style-type: none"> Coal Handling and Preparation Plant (CHPP) capable of processing approximately 1,800 tonnes per hour (tph).
Product Coal	<ul style="list-style-type: none"> Production of up to 11.3 Mtpa of thermal coal predominantly for export.
Coal Handling and Preparation Plant Reject Management	<ul style="list-style-type: none"> Coarse rejects and tailings would be incorporated, encapsulated and/or capped within open cut voids in accordance with existing Wambo management practices.
Total CHPP Rejects	<ul style="list-style-type: none"> Approximately 40.3 Mt of coarse rejects and approximately 24.5 Mt of tailings.
Water Supply	<ul style="list-style-type: none"> Make-up water demand to be met from runoff recovered from tailings storage areas, operational areas, dewatering, licensed extraction from Wollombi Brook and Hunter River.
Surface Facilities	<ul style="list-style-type: none"> Construction of surface facilities within the approved surface development area.
Mining Tenements	<ul style="list-style-type: none"> Coal Lease (CL) 365, CL374, CL397, Consolidated Coal Lease 743, Mining Lease (ML) 1402, ML1572, ML1594, Authorisation 444, Exploration Licence 7211.

Notes: ¹ Development Consent DA 305-7-2003 (as modified).

1.1.2 Scope & Objectives

The scope of this MOP applies to the Mine and includes, but not limited to, all open cut and underground mining activities, mineral processing, material handling and mine rehabilitation areas. This MOP aims to provide an efficient approach to the management of the mining operation whilst maintaining compliance with its regulatory approvals. This MOP has also been prepared to address rehabilitation requirements, as identified by Condition 94, 94A, 94B and 94C of Schedule 4 of DA 305-7-2003.

Within the MOP term the general objectives for mining operations are as follows:

- Maximise resource recovery efficiency within the approved/existing open cut boundary, producing a total of approximately 11.38 Mt of ROM coal within the MOP term;
- The South Bates Underground (SBU) mine: Continue first workings development and longwall extraction in the Wambo Seam of the remaining approved longwall panels (i.e. LW15 and LW16) in accordance with DA305-7-2003, to produce approximately 2.3 Mt of ROM coal within the MOP term; and
- The South Bates Underground Extension (SBUE) mine: Continue first workings development and commence longwall extraction in the Whybrow Seam of the first five approved longwall panels (i.e. LW17 to LW21) in accordance with DA305-7-2003, to produce approximately 9.79 Mt of ROM coal within the MOP term.

The MOP term will commence on the 1 January 2018 and expire on the 31 December 2020. During the MOP term, coal mining operations will be carried out to extract, process and transport product coal by rail. Rehabilitation of disturbed areas will be undertaken progressively as part of the mining operations. The proposed coal extraction mining areas for the open cut and underground operations within the term of this MOP (as amended) are presented in **Appendix 1**.

The approved South Wambo Underground (SWU) Mine involves the extraction of coal from longwall panels in the Woodlands Hill and Arrowfield Seams. Development of SWU is currently proposed to commence after the completion of this MOP term.

1.2 Structure of the MOP

The remainder of this MOP is structured as follows:

- Section 1:** Provides an **introduction** and details of the scope, objectives, consents, leases and licenses, mine geology, land ownership, consultation and existing environment.
- Section 2:** Describes the **proposed mining activity**, other activities, mine life, coal processing, waste disposal and material handling during the MOP term.
- Section 3:** Provides details of **the environmental issues management**, risk assessment and risk management during the MOP term.
- Section 4:** Details the **post mining land use**, regulatory requirements, post mining land use goals and rehabilitation objectives.
- Section 5:** Describes the **rehabilitation planning and management** activities, domain selection and rehabilitation phases.
- Section 6:** Provides the **performance indicators and completion criteria** for each phase of rehabilitation.
- Section 7:** Describes the **rehabilitation implementation** to include proposed rehabilitation activities over the MOP term.
- Section 8:** Outlines the **rehabilitation monitoring and research** trials to be implemented during the MOP term.
- Section 9:** Outlines WCPL **intervention and adaptive management** and contingency when threats to rehabilitation are identified.
- Section 10:** Describes the **reporting** framework and requirements for the Mine, and outlines the review and implementation of this MOP.

Section 11: The mining **plans** in A3 size are provided. The A0 mining plans are provided in **Appendix 1** (i.e. **Volume 2 & Volume 3**).

Section 12: This section provides the **references** used throughout of this MOP.

Section 13: This section provides a list of key **abbreviations** used throughout of this MOP.

Appendix 1: Plans

Plan 1A – Project Locality

Plan 1B – Pre Mining Environment (Natural Environment)

Plan 1C – Pre Mining Environment (Built Features)

Plan 1C (2) – Mine Workings

Plan 2 – Mine Domains

Plan 3A – Sequence of Mining and Rehabilitation Activities (Year 1: 2018)

Plan 3B – Sequence of Mining and Rehabilitation Activities (Year 2: 2019)

Plan 3C – Sequence of Mining and Rehabilitation Activities (Year 3: 2020)

Plan 4 – Final Rehabilitation and Post Mining Land Use at End of Approval

Plan 5 – Final Rehabilitation and Post Mining Land Use Sections

Appendix 2: DA 305-7-2003

Appendix 3: Surface Disturbance Permit (SDP)

1.3 Current Consents, Authorisations and Licences

1.3.1 Development Consent

Mining and rail activities at the Mine operate under development consents granted by the NSW Minister for Planning (or delegate) and Singleton Shire Council (SSC).

WCPL operates current open cut and underground mining activities under DA 305-7-2003 (as modified) and within the approved boundaries as displayed in **Figure 2**. DA 305-7-2003 was granted under Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) in February 2004. Activities under DA 305-7-2003 commenced in March 2004.

The construction of the rail spur, rail loop and train loadout area commenced under DA 177-8-2004 in January 2005.

In accordance with DA 305-7-2003, WCPL has development consent (**Figure 2**) to undertake open cut and underground longwall mining activities. The underground mining activities during the MOP period include:

- The SBU mine - longwall panels LW15 and LW16 within the Wambo Seam; and
- The SBUE mine – longwall panels LW17 to LW21 within the Whybrow Seam.

Table 2 provides a summary of the key approvals, leases and licences that the Mine operates under. WCPL has modified the DA305-7-2003 on fifteen occasions (**Table 3**). A copy of the modified DA 305-7-2003 is provided in **Appendix 2**.

Copies of the DA 305-7-2003, EPL 529 and mining leases are available on the Peabody website: <https://www.peabodyenergy.com/Operations/Australia-Mining/New-South-Wales-Mining/Wambo-Approvals,-Plans-Reports>.

Table 2 Mine Approvals, Leases and Licences

Relevant Authority	Instrument	Approval/Licence No.	Expiry Date
DP&E	Development Consent	• DA 305-7-2003	31 December 2039
DRG	Mining Lease (ML)	<ul style="list-style-type: none"> • Coal Lease 365 (Coal Mining Act (1973)) • Coal Lease 374 (Coal Mining Act (1973)) • Coal Lease 397 (Coal Mining Act (1973)) • Consolidated Coal Lease 743 (Coal Mining Act (1973)) • Mining Lease 1402 (Mining Act (1992)) • Mining Lease 1572 (Mining Act (1992)) • Mining Lease 1594 (Mining Act (1992)) 	Refer to Table 5
	Exploration Licence	<ul style="list-style-type: none"> • Exploration Licence A444 • Exploration Licence EL7211 	Refer to Table 5
	Mining Operations Plan (MOP)	• Wambo Coal Mine – Mining Operations Plan (as amended)	31 December 2020
EPA	Environment Protection Licence (EPL)	• EPL 529	Until the licence is surrendered, suspended or revoked. The licence is subject to review every 3 years.

Note: DP&E – Department of Planning and Environment. DRG – Division of Resources and Geoscience.

Table 3 Development Consents & Modifications

Approval Name	Number	Approval Authority	Date Granted	Expiry Date
WCPL Mining Operations				
Original consolidated consent for mine operations	DA 108/91	SSC	17/02/1992	21 years from issue of coal lease
Modification to include Wollemi Box Cut and mine	DA 108/91	SSC	16/10/1996	21 years from issue of coal lease
Modification to include Brambles Coal Transport System	DA 108/91	SSC	21/12/1998	21 years from issue of coal lease
Expansion of open cut and underground mining operations	DA 305-7-2003	DP&E	04/02/2004	31 December 2039

Approval Name	Number	Approval Authority	Date Granted	Expiry Date
(MOD 1) Modification to allow DA No. 108/91 to remain active	DA 305-7-2003	DP&E	2004	31 December 2039
(MOD 2) Re-orientation of the Wambo seam underground mine longwall panels	DA 305-7-2003	DP&E	04/05/2005	31 December 2039
(MOD 3) Upgrade of open cut workshop and underground surface facilities	DA 305-7-2003	DP&E	10/01/2006	31 December 2039
(MOD 4) Extraction of the Wollemi remnants	DA 305-7-2003	DP&E	19/04/2006	31 December 2039
(MOD 5) Construction of a temporary by-pass of North Wambo Creek	DA 305-7-2003	DP&E	20/10/2006	31 December 2039
(MOD 6) Construction of the North Wambo Creek Diversion, gas and dewatering wells	DA 305-7-2003	DP&E	25/01/2007	31 December 2039
(MOD 7) Construction of internal water storage dam – Chitter Dam	DA 305-7-2003	DP&E	22/06/2009	31 December 2039
(MOD 8) Construction of internal water storage dam – South Wambo Dam	DA 305-7-2003	DP&E	27/08/2009	31 December 2039
(MOD 9) Preparation of an Extraction Plan rather than a Subsidence Management Plan	DA 305-7-2003	DP&E	28/02/2011	31 December 2039
(MOD 11) Montrose Water Storage Dam	DA 305-7-2003	DP&E	18/01/2013	31 December 2039
(MOD 12) South Wambo Underground Mine Modification	DA 305-7-2003	DP&E	12/12/2016	31 December 2039
(MOD 13) Additional Longwalls LW9-10	DA 305-7-2003	DP&E	08/07/2013	31 December 2039
(MOD 14) Additional Longwall LW10a	DA 305-7-2003	DP&E	10/04/2015	31 December 2039
(MOD 15) South Bates (Wambo Seam) Underground Mine Modification	DA 305-7-2003	DP&E	10/11/2015	31 December 2039
(MOD 16) United Wambo Open Cut Mine	DA-305-7-2003	DP&E	Pending	Pending
(MOD 17) South Bates Underground Extension (Whybrow Seam)	DA-305-7-2003	DP&E	20/12/2017	31 December 2039
WCPL Rail Development				
Jerry's Plains Rail Line	DA 235/97	SSC	16/07/1998	Perpetuity
Modification to DA235/97 to correct residents list and allow the preparation of management plans in a staged manner	DA 235/97	SSC	01/05/2003	Perpetuity
Altered alignment of Jerry's Plains Rail Line	DA 235/97.3	SSC	03/12/2004	Perpetuity
WCPL rail and coal loading infrastructure	DA 306-7-2003	DP&E	01/06/2004	Superseded by DA 117-8-2004
WCPL rail and coal loading infrastructure (altered alignment of rail loop)	DA 117-8-2004	DP&E	16/12/2004	16/12/2025
(MOD 1) Upgrade of Wallaby Scrub Road / Golden Hwy Intersection	DA 117-8-2004	DP&E	15/12/2006	16/12/2025
(MOD 2) Establishment of a locomotive provisioning facility adjacent to the WCPL Rail Loadout Facility	DA 117-8-2004	DP&E	12/02/2012	16/12/2025
(MOD 3) Harmonisation with United Wambo Open Cut Mine	DA 117-8-2004	DP&E	Pending	Pending

Note: MOD10 was withdrawn by WCPL.

1.3.2 Rehabilitation Management Plan

During preparation of the previous MOP (2015-2020), the DRE (now DRG) determined that an approved MOP will satisfy the requirements of Condition 94C, Schedule 3 of DA305-7-2003 (i.e. for preparation of a Rehabilitation Management Plan (RMP) to the satisfaction of the Executive Director of Mineral Resources).

In consultation with the DP&E, WCPL received acknowledgment on the 4 May 2015 the MOP would satisfy the requirements of the RMP, subject to the MOP being approved by the Executive Director Mineral Resources. **Table 4** provides the conditions as they related to Condition 94C, Schedule 3 of DA305-7-2003 and where they are addressed in this MOP.

Table 4 Rehabilitation Management Plan Requirements

Condition 94C, Schedule 3 of DA305-7-2003	MOP Section
94C. The Applicant must prepare and implement a Rehabilitation Management Plan for the Wambo Mining Complex to the satisfaction of DRG. This plan must:	
(a) be prepared in consultation with the Department, CLWD, OEH, Council and the CCC;	Section 1.5
(b) be submitted to DRG by the end of June 2013;	
(c) be prepared in accordance with any relevant DRG guideline;	Section 1.0
(d) describe how the rehabilitation of the site would be integrated with the implementation the biodiversity offset strategy;	Section 3.3.7 and Section 5.3
(e) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and triggering remedial action (if necessary);	Section 6.0 and Section 9.0
(f) describe the measures that would be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform, and final land use;	This document
(g) include a detailed tailings management strategy that includes timing for rehabilitation of all tailings storage facilities, in order that final land form and land use objectives can be achieved in a timely manner;	Section 2.3.2.7
(h) include a plan that describes proposed grazing carrying capacity across the post mining landscape;	Section 8.4
(i) include interim rehabilitation where necessary to minimise the area exposed for dust generation;	Section 2.3.9
(j) 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	Section 8.2
(k) build to the maximum extent practicable on the other management plans required under this consent.	Section 8.1 and Section 8.2

1.3.3 Mining Leases & Exploration Licences

The Open Cut, SBU mine and SBUE mine are located within a combination of coal and mining leases including ML 1402, ML 1572, ML 1594, CL 365, CL 374, CL 397 and CCL 743 (Plan 1C). Mining lease conditions as they relate to rehabilitation are tabularised (**Table 19**) in **Section 4.1**. The date of grant and duration of key approvals and licences issued by government agencies relevant to the WCPL underground operations are provided in **Table 5** below.

Table 5 Mining Leases and Authorisations

Lease Reference	Area (ha)	Date Granted	Expiry Date
Coal Lease 365 (Coal Mining Act 1973)	530	19/09/1990	19/09/2032
Coal Lease 374 (Coal Mining Act 1973)	382	06/12/1991	21/03/2026

Lease Reference	Area (ha)	Date Granted	Expiry Date
Coal Lease 397 (Coal Mining Act 1973)	1,480	04/06/1992	4/06/2034
Consolidated Coal Lease 743 (Coal Mining Act 1973)	3,000	09/03/1990	14/08/2022
Mining Lease 1402 (Mining Act 1992)	352	23/09/1996	14/08/2022
Mining Lease 1572 (Mining Act 1992)	1,012	21/12/2005	21/12/2026
Mining Lease 1594 (Mining Act 1992)	263	01/05/2007	30/04/2028
Exploration Licence A444 [^]	3,060	04/10/2007	16/05/2016
Exploration Licence EL7211	967	29/09/2008	29/09/2019

Notes: United has a strata title lease to the Arrowfield seam in the northern 1.5 km of CCL743 and CL397.
 Mining Lease 1402 covered surface rights to enable development of the Wollemi Mine.
[^]A444 is an Authority to Prospect granted under *Coal Mining Act 1973*.
^{*}Licence Renewal Application was submitted to the DRE on 16 May 2016 and is currently under review.

1.3.4 Environment Protection Licence

The Mine operates under Environmental Protection Licence 529 (EPL 529), issued by the NSW Environment Protection Authority (EPA), under the authority of the *Protection of the Environment Operations Act 1997*. EPL 529 covers WCPL activities at the Mine and rail spur.

1.3.5 Extraction Plan Approvals

An Extraction Plan (EP) was approved on the 9 February 2016 to allow for longwall extraction of panels LW11 to LW13 within the Whybrow Seam at the SBU mine. This EP was revised to incorporate longwall panels LW14 to LW16 in the Wambo Seam (for a combined EP for LW11 to LW16). The EP for SBU LW11 to LW16 (*Extraction Plan - South Bates Underground Mine Longwalls 11 to 16*) was conditionally approved by the DP&E on the 16 May 2017. The approval considered the reduced lengths of LW13 to LW16 would result in similar or less subsidence related impacts to those approved as part of the approved layout and therefore can be generally in accordance with the Development Consent DA305-7-2003 as modified.

An EP is required to be prepared and approved prior to the commencement of any secondary extraction at SBUE. This will occur during this MOP term.

1.3.6 EPBC Approvals

WCPL was granted approval (EPBC 2003/1138) under the *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) for the expansion of the mine on the 23 November 2004. In accordance with the approval WCPL prepared a Flora and Fauna Management Plan (FFMP) (**Section 3.3.7**) to address the conditions set out in *EPBC 2003/1138*. The FFMP was revised in March 2016 and subsequently renamed as the Biodiversity Management Plan (BMP).

The BMP was issued to the DP&E on the 28 October 2016 after extensive consultation with NSW Office of Environment and Heritage (OEH) and the Department of the Environment and Energy (DoEE). On the 17 November 2016 the DoEE approved the BMP. On the 1 November 2016 the OEH endorsed the BMP. Although the BMP did not receive final approval by the DP&E until 11 October 2017, key elements of the BMP applicable to this MOP including completion criteria, biodiversity management and monitoring programs have been implemented since late 2016. A copy of the BMP is available at <https://www.peabodyenergy.com/Operations/Australia-Mining/New-South-Wales-Mining/Wambo-Approvals,-Plans-Reports>.

Separate approval (EPBC 2016/7636) under the EPBC Act was granted on 30 April 2017 for portions of the SWU that were not covered by EPBC 2003/1138. Approval for SBUE was also required under the EPBC Act (EPBC 2016/7816).

1.3.7 Water Licences

WCPL currently holds water licences for a number of test and dewatering bores located within and outside the mining lease. **Table 6** details the current water licenses held by WCPL.

Table 6 Water Access Licences (Water Management Act 2000)

Licence Number	Description	Expiry Date	Entitlement	Category
Hunter Regulated River Water Source				
WAL 718 (20SL060212)	Hunter River Pump	Perpetuity	1000 unit shares (high security)	Regulated River (high security)
WAL 8599 (20SL061206)	Hunter River Pump	Perpetuity	6 unit shares (high security)	Regulated River (high security)
WAL 8600 (20SL061206)	Hunter River Pump	Perpetuity	868 unit shares (general security)	Regulated River (general security)
WAL 8604 (20BL061206)	Hunter River Pump	Perpetuity	240 unit shares (supplementary water)	Supplementary Water
Hunter Unregulated and Alluvial Water Sources (Lower Wollombi Brook Water Source)				
WAL18437 (20SL033872)	Wollombi Brook Pump	Perpetuity	350 unit shares	Unregulated River
WAL 23897 (20BL167737)	Well No. 2	Perpetuity	70 unit shares	Aquifer
North Coast Fractured and Porous Rock Groundwater Sources (Sydney Basin - North Coast Groundwater Source)				
WAL 39735 (20BL168643) ¹	Dewatering Bore	Perpetuity	40 unit shares	Aquifer

Licence Number	Description	Expiry Date	Entitlement	Category
WAL 39738 (20BL132753) ¹	Old Well No. 1	Perpetuity	243 unit shares	Aquifer
WAL 39803 (20BL166910) ¹ (20BL173032) ¹ (20BL173033) ¹ (20BL173034) ¹ (20BL173035) ¹	Dewatering (Bore No. 1)	Perpetuity	450 unit shares	Aquifer
WAL41494 (20BL168017) ¹ (20BL172061) ^{#1} (20BL173040) ¹	Dewatering (Bore No. 2 and 2a)	Perpetuity	750 unit shares	Aquifer
WAL41532 (20BL172156) ¹	Dewatering	Perpetuity	98 unit shares	Aquifer
WAL41528 20BL167738 ^{#1}	Dewatering Bore	11/09/15	57 ML/year	NA
WAL41520 20BL173844 ¹	Dewatering Bore	04/09/2019	9 ML/year	NA
20BL168997	Piezometer	Perpetuity	Groundwater monitoring	NA
20BL168998	Piezometer	Perpetuity	Groundwater monitoring	NA
20BL168999	Piezometer	Perpetuity	Groundwater monitoring	NA
20BL169000	Piezometer	Perpetuity	Groundwater monitoring	NA
20BL170638	Piezometer	Perpetuity	Groundwater monitoring	NA
20BL172237	Monitoring Bore (GW14, GW18, GW21)	Perpetuity	Groundwater monitoring	NA
20BL172238	Monitoring Bore (GW12)	Perpetuity	Groundwater monitoring	NA
20BL172240	Monitoring Bore (GW15)	Perpetuity	Groundwater monitoring	NA
20BL172242	Monitoring Bore (GW16, GW17)	Perpetuity	Groundwater monitoring	NA
20BL172244	Monitoring Bore (GW20)	Perpetuity	Groundwater monitoring	NA
20BL172255	Monitoring Bore (GW22)	Perpetuity	Groundwater monitoring	NA
20BL172256	Monitoring Bore (GW13)	Perpetuity	Groundwater monitoring	NA
20BL172257	Monitoring Bore (GW19)	Perpetuity	Groundwater monitoring	NA
20BL172332	Piezometer	Perpetuity	Groundwater monitoring	NA
20BL173032	Monitoring		Groundwater monitoring	NA
20BL173290	Monitoring Bore	Perpetuity	Groundwater monitoring	NA
20BL173291	Monitoring Bore	Perpetuity	Groundwater monitoring	NA
20BL173292	Monitoring Bore	Perpetuity	Groundwater monitoring	NA
20BL173293	Monitoring Bore	Perpetuity	Groundwater monitoring	NA
20BL173946	Monitoring	Perpetuity		NA
20BL009818	Bore	Perpetuity	Stock	NA

Licence Number	Description	Expiry Date	Entitlement	Category
20BL009819	Bore	Perpetuity	Stock	NA
20BL009820	Bore	Perpetuity	Stock	NA
20BL009821	Bore	Perpetuity	Stock	NA
20BL143779	Bore	Perpetuity	Stock/Domestic	NA

WAL = water access licence, ML/year = megalitres per year.

Renewal lodged.

- In mid-2015, WCPL applied to the Department of Primary Industries – Water (DPI-Water) to combine all of its groundwater licences that contained an extraction entitlement into a single licence. The purpose of this licence was to streamline mining activities and simplify the reporting of extraction against licensed entitlements. As such, WCPL was licensed to extract a total of 1,647 ML from all groundwater sources under the *Water Act 1912*. This combined licence was confirmed to be active by DPI-Water in correspondence received on the 18 February 2016, the status of its' conversion to licences under the *Water Management Act 2000* is yet to be advised by DPI-Water.

20BL prefix bore licences are no longer valid and those with allocations are being replaced with Water Access Licences (WALs).

1.4 Land Ownership and Land Use

1.4.1 Land Ownership

WCPL owns a significant area of land³, including all of the land within the area consented to be disturbed by open cut mining and all of the land that overlies the SBU mine and SBUE mine. WCPL land ownership is shown on **Plan 1C**.

In accordance with DA 305-7-2003, WCPL has de-gazetted and closed off Pinegrove Road which is located in the north western extent of the current approved open cut limit. Pinegrove Road was required to be closed for mining in the Montrose East and Montrose West Pits. WCPL owns all of the land serviced by Pinegrove Road. **Table 7** identifies the schedule of land ownership.

1.4.2 Land Use

Other land use includes previously cleared grazing land and patches of remnant native woodland. Land use in the vicinity of WCPL is characterised by a combination of coal mining operations, agricultural land uses and rural residential development (evident in the local villages of Bulga, Jerrys Plains and, to a lesser extent, Warkworth). WCPL controlled lands that are not subject to mine operations are utilised for the agistment of stock (primarily cattle) and provide a buffer to neighbouring coal operations and private landholders and the adjoining Wollemi National Park.

An aerial photograph of the WCPLs and surrounds is provided on **Figure 2**. Significant areas of land which overlie SBU mine and SBUE mine have been previously disturbed by historical agricultural uses. Underground access to the SBU and SBUE mine are from highwall entries in the existing open cut. The open cut mining operations is bounded by the United Colliery and the Golden Highway to the north and Wollombi Brook to the east.

Table 7 Schedule of Land Ownership

Schedule of Land Ownership	
WCPL Freehold	
Lot 79 DP753792	Lot 181 DP823775

³ Lot 170, DP 823775 is Crown Reserve. The mine plan has been designed to avoid the portion of Crown Reserve to the north of the Montrose East mining area.

Schedule of Land Ownership	
Lot 57 DP753817	Lot 177 DP823775
Lot 160 DP753817	Lot 118 DP753792
Lot 18 DP753817	Lot 95 DP753792
Lot 71 DP753817	Lot 2 DP709722
Lot 161 DP753817	Por 131 DP753792
Lot 49 DP753792	Lot 2 DP616303
Lot 50 DP753792	Lot 1 DP720705
Lot 51 DP753792	Lot 2 DP720705
Lot 52 DP753792	Lot 3 DP720705
Lot 58 DP753792	Lot 4 DP720705
Lot 66 DP753792	Lot 45 DP753792
Lot 67 DP753792	Lot 46 DP753792
Lot 62 DP753792	Lot 4 DP542226
Lot 63 DP753792	Lot 5 DP542226
Lot 64 DP753792	Lot 1 DP241316
Lot C DP33149	Lot 7 DP3030
Lot 22 DP753817	Lot 23 DP3030
Lot A DP33149	Lot 92 DP755267
Lot 79 DP753821	Lot 109 DP753792
Lot 19 DP3030	Lot 110 DP753792
Lot 129 DP755267	Lot 111 DP753792
Lot 22 DP755267	Lot 112 DP753792
Lot 1 DP616303	Lot 103 DP753792
Lot 100 DP753792	Lot 104 DP753792
Lot 101 DP753792	Lot 82 DP548749
Lot 38 DP753792	Lot 83 DP548749
Lot 39 DP753792	Lot 1 DP110084
Lot 60 DP753792	Lot 2 DP110084
Lot 61 DP753792	Lot B DP33149
Lot 1 DP709722	Lot 113 DP753817
Lot 55 DP753792	Lot 2 DP617852
Pine Grove Road (WCPL Owned)	
Road bounded by Lots 7,19 & 23 DP 3030, Lots 22 & 129 DP755267, Lot 83 DP548749 and Lot 1 DP110084	
Crown Land	
Lots 170, 175 DP 823775	Lot 208 DP 753817
Lot 76 DP753821	Lot 78 DP753821
Travelling Stock and Camping Reserve No. 5294	
Lot 175 DP 823775	
Council Roads	
Wambo Mine Road	Road within Lot 1 DP 616303
Crown Roads	
Bounded by Lots 92 & 129 DP 755267	Bounded by Lots 4 & 5 DP 542226, Lots 2 & 3 DP720705

Schedule of Land Ownership	
	and Lot 2 DP 616303
Bounded by Lots 38, 55, 61, 100, 101, 149 DP 753792, Lot 2 DP617852 and Lot 1 DP 616303	Within Lot 2 DP617852
Bounded by Lots 175, 177, 181 DP 823775	Bounded by Lot 177 DP 823775, 60, 62-64, 95, 118 DP 753792, Lot 2 DP617852
Bounded by Lots 170, 177 DP 823775, 49-51, 58, 118 DP 753792	Bounded by Lots 170 DP 823775, 49, 50, 52, 79 DP 753792, 18, 160, 161 DP753817
Bounded by Lots A & B DP 33149, 22, 66, 67, 71 DP 753817	Adjoining to the East and North Lot 79 DP753821
Wollombi Brook	
Bounded by Lots 22 DP 755267, Lot 83 DP 548749, Lot 1 DP 110084, Lot 1 DP 241316, Lot 7 DP 3030	
Private Land within Mining Leases	
Lot 3 DP735566	Lot 92 DP586792
Lots 1, 54, 17, 20, 19, 6, 7, 23, 18 DP595702	Lot 91 DP586792
Lot 312 DP579424	Lot 23 DP858472
Lot 311 DP579424	Lot 2 DP595702
Lot 1 DP178612	Lot 1 DP 735566

Notes: Council controlled roads have been identified using geographical names where possible. Council and Crown roads and sections of Wollombi Brook with no real property identifier have their location described relative to adjoining lots.

1.5 Stakeholder Consultation

With the exception of some remediation of previous subsidence, all of the Mine's activities for this MOP are entirely contained within WCPL owned land. There are several private properties and portions of Crown Land within WCPL mining leases (**Table 7** and **Plan 1C**). Consultation with Crown Lands and private landholders are provided in **Section 1.5.1** and **Section 1.5.2**. Consultation regarding proposed remediation activities has occurred with the one affected landholder.

Consultation in relation to the Project EIS was undertaken in 2002, 2003 and 2004 with regulatory authorities, non-government organisations, relevant Aboriginal groups and the local community. This included community meetings in Jerrys Plains and at WCPL. In addition, consultation for consecutive modifications of DA305-7-2003 has been undertaken. Consultation with the local community, Aboriginal stakeholders, United Collieries, key state government agencies and Singleton Shire Council (SSC) is ongoing, including as part of the recent MOD 17 consultation conducted in 2016 and 2017.

Consultation with United Collieries regarding the MOP commenced in May 2015 and is ongoing. WCPL and United Collieries have entered into a Joint Venture (JV) with adjoining mining tenements. Ongoing consultation with United Collieries will be undertaken regarding the JV and future operations, as required, during the MOP term.

The Project EIS and environmental assessments that accompany the various modifications are provided on the DP&E and Peabody's webpage for the Mine.

1.5.1 Government Consultation

A meeting was held with DRG on 13 November 2017 and 1 December 2017 to discuss proposed amendments to the 2015-2020 MOP in advance of the approval of MOD 17. The outcome of this consultation was that a new MOP would be prepared.

Under Condition 94C, Schedule 4 of DA 305-7-2003, the Rehabilitation Management Plan (RMP) component of the MOP is required to be prepared in consultation with DP&E, Crown Lands and Water Division (CLWD), OEH, SSC and the CCC.

These stakeholders are regularly consulted as part of ongoing operations. Consultation specific to rehabilitation will occur with these stakeholders within 3 months of the approval of MOD 17. Any changes to the MOP required as a result of this consultation will form a future MOP amendment.

1.5.2 Community Consultation

Ongoing community consultation in regards to the MOP was completed in accordance with the WCPL Environmental Management Strategy (EMS) via the CCC. The CCC was formed back in September 2005. Minutes from the CCC are placed on the WCPL webpage. The website is maintained in accordance with DA 305-7-2003 requirements. The website provides the wider community with access to the sites monitoring results, details of current activities, proposed blast times, policies, environmental management plans and monitoring programs and any other information in relation to the site operation that may be considered of interest to the community.

WCPL also conducts regular open information sessions which are held in the local village of Jerrys Plains to allow community members access to key WCPL personnel to discuss all aspects of the Mine's operations.

The Peabody website address for WCPL is: <https://www.peabodyenergy.com/Operations/Australia-Mining/New-South-Wales-Mining/Wambo-Approvals,-Plans-Reports>

Table 7 identifies the various private landholders within WCPL mining leases. A copy of the MOP, if requested, will be provided to each land holder. WCPL provided information regarding the new MOP during the latest CCC meeting held on 11 December 2017.

The Annual Review (formally known as the Annual Environmental Management Report or AEMR) also provides information about the preparation of the new MOP and the status of the operation.

1.6 Rehabilitation and Mine Closure

1.6.1 Conceptual Mine Closure Plan

WCPL and United Collieries have entered into a JV over adjoining tenements in relation to the United Wambo Open Cut Coal Mine Project. The United Wambo Open Cut Coal Mine Project seeks to combine the existing open cut operations at the Mine with a proposed new open cut coal mine at the United Collieries. WCPL's CHPP and underground operations do not form part of the JV, and will continue to be owned and operated by WCPL under DA 305-7-2003.

The United Wambo Open Cut Coal Mine Project will affect the final landform and extend the life of open cut operations beyond the term of this MOP. The CHPP and underground operations are not planned for closure under DA 305-7-2003 until 2039.

Noting the above, WCPL are revising the conceptual Mine Closure Plan (CMCP) to undertake life of mine closure planning for mining operations. A revised CMCP is planned for submission to the DRG and other relevant stakeholders by the end of 2018. The CMCP will incorporate a review of the constraints and opportunities to identify potential sustainable land-use options, in consultation with relevant stakeholders in order to obtain feedback of any issues that need to be considered as part of the final land use analysis.

In addition, the CMCP will provide detailed decommissioning works for infrastructure, in general:

- Infrastructure with no ongoing beneficial use would be removed from the site at the completion of the project. Foundation slabs of certain buildings may be retained for suitable end-use goals in

agreement with the relevant authorities and stakeholders. Alternatively, they would be excavated for disposal or buried in a void in an approved manner.

- Process reagents and fuels unused at the completion of mining would be returned to the supplier in accordance with the relevant safety and handling procedures. Foundation soils would be chemically tested, contour ripped and chemically ameliorated, as required (in accordance with EPA requirements). Stockpiled soils would then be applied as necessary and stabilised. Revegetation would be undertaken with suitable endemic tree species or pastures, consistent with the Project revegetation strategy (see **Section 3.3.7**).
- Roads that have no specific post-mining use would be ripped, topsoiled and revegetated. Some access roads may be retained post-mining to enable access and for use in bushfire and other land management activities.
- Water management structures and sediment control structures would either be retained as wetland habitat/water features or decommissioned and rehabilitated. The design, capacity and final location of these post mining water management structures will be refined and detailed in revised water management plans as the Mine progresses towards mine closure. Some access roads may be retained post-mining to enable access and for use in bushfire and other land management activities.

Rehabilitation monitoring results would be used to confirm rehabilitation areas are on a trajectory towards a self-sustaining ecosystem and towards meeting the rehabilitation completion criteria. Monitoring results would also be used to determine the requirement for maintenance and/or contingency measures (e.g. supplementary plantings) to improve rehabilitation performance. Contingency measures are described further in **Section 9.2**.

At mine closure, the need for maintenance/intervention would be no greater than that required for the surrounding lands whether it be for grazed lands or for existing remnant vegetation areas such as the Remnant Woodland Enhancement Program (RWEPP) areas.

Upon the cessation of mining operations, it would be expected that tenure of the mining leases would be maintained by WCPL until such time as lease relinquishment criteria (including rehabilitation completion criteria) were satisfied. Lease relinquishment criteria would be developed in consultation with relevant authorities and stakeholders.

It is anticipated that lease relinquishment criteria would include, but not necessarily be limited to the following:

- Land tenure;
- Landform stability and public safety;
- Water quality;
- Trajectory towards self-sustaining ecosystems; and
- Fulfilment of mining lease and other statutory approval conditions.

Rehabilitation performance would be considered to be satisfactory when the assessment process indicates a trajectory towards self-sustaining ecosystems across the rehabilitation areas. Once this rehabilitation status has been achieved, monitoring and maintenance programs may be ceased in consultation with the relevant regulatory authorities and key stakeholders at which stage a mining lease relinquishment process would be commenced.

The final determination of the success of rehabilitation prior to relinquishment would be made by the relevant authorities.

The strategies and planning set out in the MOP, with respect to mine closure, reflect the current stages of mine development and will be reviewed in consultation with all relevant government and community stakeholders during the life of the mine as strategies and planning mature and develop further. This will allow the MOP to be used as a dynamic document that can be continually improved over the life of the mine. The MOP will be reviewed and updated accordingly during the MOP term.

1.6.2 Final Void Management Plan

A draft FVMP, a requirement of Condition 39, Schedule 4 of DA 305-7-2003, was submitted in June 2016.

The Final Void Management Plan (FVMP), a component management plan of the CMCP, is currently under review. Changes to the location and nature of final voids are being proposed as part of the United Wambo Open Cut Coal Mine Project (SSD 15_7142).

Any revised FVMP will include a detailed description of the design and long-term management of the final voids. Final void management issues that will be addressed by the FVMP include;

- Assessment of the predicted hydrological behaviour (long-term water quantity/quality);
- Groundwater/surface water management (inflows/outflows);
- Long-term geotechnical stability of the voids;
- Public safety, including the construction of bunds;
- Access requirements; and
- Water quality monitoring requirements.

1.6.3 Rehabilitation Management Plan

Condition 94C, Schedule 4 of DA307-7-2003 requires the Rehabilitation Management Plan (RMP) to describe measures that would be implemented to ensure compliance with relevant conditions of the DA305-7-2003 and address all aspects of rehabilitation including mine closure, final landform and final use. As previously discussed, DP&E has acknowledged the MOP can satisfy the requirements of the RMP, subject to the MOP being approved by the Executive Director Mineral Resources. **Table 19** outlines where the rehabilitation regulatory requirements are addressed in this MOP regarding mine closure.

2.0 Proposed Mining Activities

2.1 Project Description

A range of open cut and underground mine operations have been conducted at the Mine since mining operations commenced in 1969. Mining under the DA 305-7-2003 commenced in 2004 and currently both open cut and underground operations are conducted. The Mine has approval in accordance with DA305-7-2003 to carry out mining operations until 31 December 2039.

The approved run-of-mine (ROM) coal production rate is 14.7 million tonnes per annum (Mtpa) and product coal is transported from WCPL by rail. The approved Open Cut, Underground and associated infrastructure area at the Mine (**Figure 2**) comprise an area of approximately 1,990 ha. A summary of the approved Wambo Coal Mine is provided in **Table 1**.

The mining sequence and rate of mining would continue to be subject to review on the basis of market conditions and customer demand, coal quality or unforeseen changes to mining conditions. An indicative mining sequence for both the Open Cut and Underground operations during the MOP term are provided in **Plans 3A – 3C**. However, the mining sequence within the approved open cut extents will continue to be subject to periodic revision over the life of the mine. Any variation of the mining sequence as described in this MOP would require WCPL to amend the MOP as required by the *MOP Guidelines* and in consultation with the DRG.

Open Cut mining operations at the Mine involve the extraction of coal from the Whybrow, Redbank Creek, Wambo and Whynot Seams (**Figure 3**). The Open Cut is bounded by the United Colliery and the Golden Highway to the north, Wollombi Brook to the east (**Figure 2**) and by uneconomic strip ratios to the south and west. The open cut mining fleet includes excavators, dozers, front end loaders, haul trucks, water trucks, service trucks, graders and drills.

The Open Cut mining operation uses a combination of truck and excavator mining and dozer bulk pushing of blasted overburden into the previous strip void, followed by the removal of coal and interburden, operating 24 hours per day, seven days per week (**Section 2.3.3**).

Coal and interburden are mined in a similar manner to the overburden where dozers are used to rip and push the coal/interburden, followed by truck loading using excavators. Some interburden and coal blasting is also required, depending on the thickness and hardness of the material. Overburden and interburden that is not bulk pushed with dozers is hauled into the previous strip void using haul trucks.

The following underground mines at WCPL are approved (**Figure 2**):

- North Wambo Underground Mine (Wambo Seam) (mining completed);
- South Bates Underground Mine (Whybrow and Wambo Seams) (covered by this MOP, extraction in the Whybrow Seam completed);
- South Bates Extension Underground Mine (Whybrow Seam) (covered by this MOP); and
- South Wambo Underground Mine (Woodlands Hill and Arrowfield Seams) (proposed following the completion of this MOP term).

Figure 3 Stratigraphy of the Wambo Coal Mine Area

SUPERGROUP	GROUP	SUBGROUP	FORMATION	SEAM	
SINGLETON SUPERGROUP	NARRABEEN GROUP	WIDDEN BROOK CONGLOMERATE			
		GLEN GALLIC SUBGROUP	Greigs Creek Coal		
	Redmanvale Creek Formation				
	NEWCASTLE COAL MEASURES ¹	DOYLES CREEK SUBGROUP	Dights Creek Coal		
			Waterfall Gully Formation		
		HORSESHOE CREEK SUBGROUP	Pinegrove Formation		
			Lucernia Coal		
			Strathmore Formation		
			Alcheringa Coal		
			Clifford Formation		
			Charlton Formation		
		APPLETREE FLAT SUBGROUP	Abbey Green Coal		
		WITTINGHAM COAL MEASURES	WATTS SANDSTONE		
	DENMAN FORMATION				
	JERRYS PLAINS SUBGROUP		Mount Leonard Formation	<i>Whybrow Seam²</i>	
			Althorpe Formation		
			Malabar Formation	<i>Redbank Creek Seam²</i>	
				<i>Wambo Seam²</i>	
				<i>Whynot Seam²</i>	
				<i>Blakefield Seam</i>	
			Mount Ogilvie Formation	<i>Glen Munro Seam</i>	
				<i>Woodlands Hill Seam²</i>	
			Milbrodale Formation		
			Mount Thorley Formation	<i>Arrowfield Seam²</i>	
				<i>Bowfield Seam²</i>	
				<i>Warkworth Seam³</i>	
			Fairford Formation		
			Burnamwood Formation	<i>Mount Arthur Seam³</i>	
				<i>Piercefield Seam³</i>	
				<i>Vaux Seam³</i>	
				<i>Broonie Seam</i>	
				<i>Bayswater Seam</i>	
ARCHERFIELD SANDSTONE					
VANE SUBGROUP	Bulga Formation				
	Foybrook Formation				
	Saltwater Creek Formation				

¹ Previously known as the Wollombi Coal Measures.
² Coal reserves currently approved to be mined at the Wambo Coal Mine.
³ Coal reserves proposed to be mined by the United Wambo Open Cut Coal Mine Project (SSD 7142).

The NWU mine longwall panels LW1 - 5 have been developed off main headings driven from the existing Bates North highwall. Access to NWU mine longwall panels LW6 to LW10 (and LW10a) is from the Homestead In-Pit open cut highwall. ROM coal is conveyed to a 70,000 tonne (t) capacity stockpile adjacent to the open cut highwall where it is loaded into haul trucks and hauled to the ROM bin or the ROM coal stockpile.

The SBU and SBUE mines are accessible of main headings driven from the Bates South highwall. ROM coal is conveyed to a stockpile where it is loaded into haul trucks and hauled to the ROM bin or the ROM coal stockpile.

Underground mining equipment includes continuous miners, longwall mining equipment, electric shuttle cars, load haul dump machines and personnel transporters.

ROM coal will either be washed at the CHPP or where required by-passed to the product stockpile and then loaded onto train carriages via the rail load facility. Coal rejects produced through the washing process are transported via the operational mining fleet and positioned within the overburden waste dumps, while tailings are deposited via pipelines to tailing storage facilities located in open cut voids.

Onsite maintenance and servicing of heavy mining equipment is also undertaken at the Heavy Vehicle Workshop and in the field as required.

2.2 Asset Register

WCPL have developed an asset register of major infrastructure within the Mine's Primary Domains (**Plan 2** and **Figure 8**). Details regarding the Mine's domains are provided in **Section 5.1** and **Table 20**.

Table 8 summarises the major infrastructure assets within each Primary Domain that includes the domain area, a description of the major infrastructure and general infrastructure construction details including areas, lengths and volumes.

Table 8 Major Infrastructure within Primary Domains

Primary Domains	Domain Area (ha)	Open Cut		Underground	
		Major Infrastructure Assets	Area/ Length	Major Infrastructure Assets	Area/ Length
Mine Infrastructure Areas (Domain 1)	252.1	Rail loop	14300m		
		Small buildings (Main Workshop Area)	152.3m ²	Small Buildings (Main Workshop Area)	2085.63m ²
		Industrial Buildings (Main Workshop Area)	1345.2m ²	Industrial Buildings (Main Workshop Area)	457m ²
		Overhead powerlines	7000m	Overhead powerlines	16000m
		Concrete pads, footings and bitumen (car park) for dumping in a void on the site (Main Workshop Area)	4110m ²		
		Concrete pads, footings and bitumen (car park) (Admin)	10909.9m ²	Concrete pads, footings and bitumen (car park) (Admin)	30664m ²
		Small buildings (Admin)	745.2m ²	Small buildings (Admin)	2014m ²
		Industrial Buildings (Admin)	1205.66m ²	Industrial Buildings (Admin)	300.88m ²
		Small buildings Tanks (Sewerage)	450m ²	Small buildings Tanks (Sewerage)	559m ²
		Roadways	25000m ³	Roadways	10706m ³
Water Management (Domain 2)	34.8			Dewatering Bores	2500m ²
				Mine Water Dams	563827.3m ²
				Clean Water Dams	25843.5m ²

Primary Domains	Domain Area (ha)	Open Cut		Underground	
		Major Infrastructure Assets	Area/Length	Major Infrastructure Assets	Area/Length
Tailings Emplacement Areas (Domain 3)	56.2	North East Tailings Dam	26.1 ha		
		Hunter Pit Tailings Dam	14.3 ha		
North Wambo Creek Diversion (Domain 7)	90	Creek Diversion	4.25km		
Coal Handling Preparation Plant (Domain 10)	28.6	Coal Handling Prep. Plant	4074.3m ²		
		Conveyors & gantries (includes overland conveyors)	2344.3m	Conveyors & gantries (includes overland conveyors)	2030m
		Concrete Pads and Footings	7318.7m ²		
		Large Tanks	2307.38m ²		
		Small Buildings	921.9m ²		
		Industrial buildings	566.4m ²		
		Carbonaceous material (spillage or otherwise) within footprint of the CHPP, ROM & Product stockpiles, conveyors and workshops	31033m ³		

2.3 Activities over the MOP Term

2.3.1 Exploration

WCPL will undertake exploration and prospecting activities within DA305-7-2003 approved mining authorisations during the MOP term. These authorisations consist of:

- CL365
- CCL743
- ML1594
- ML1402
- CL397
- ML1572
- CL374

Exploration and ancillary prospecting activities will be undertaken to further define coal reserves, coal quality and gas content of the Whybrow, Redbank Creek, Wambo, Whynot, Woodlands Hill, Arrowfield and Bowfield coal seams.

Exploration and ancillary prospecting activities outside of DA305-7-2003 but within mining titles may also be undertaken during the term of the MOP.

Prior to any exploration and ancillary prospecting disturbance commencing a WCPL Surface Disturbance Permit (SDP) is approved and issued. The SDP identifies environmental, heritage and regulatory constraints requiring further management. The SDP is included as **Appendix 3** for reference.

All assessments of disturbance occurring due to exploration activities will consider *ESG5: Assessment Requirement for Exploration Activities* (DRG, 2017).

Disturbance relating to exploration is always minimised but may consist of slashing and removal of flora from access tracks and drill pad areas. Earth works may comprise the levelling of drill pads where a slope is present and installation of in ground sumps where above ground sumps are not feasible. All disturbance activities and site specific controls are detailed in the SDP.

Small scale earth moving machinery, water carts and track/tyred drill rigs will be utilised during site commissioning, operation and decommissioning. Where large scale equipment is proposed to be utilised for disturbance activities the potential environmental impacts will be assessed as part of the SDP assessment process.

Decommissioning and sealing of boreholes and site rehabilitation will be consistent with the *Exploration Codes of Practice - Rehabilitation* and *Exploration Code of Practice: Environmental Management* (DRG, 2017). Decommissioning of exploration sites consists of the disposal of all waste from site, sealing of borehole to surface and removal of drill casing from one meter below surface. Drill sites are stabilised, decompacted, topsoil replaced and seed applied as necessary to facilitate the sites return to former land use.

WCPL operate under an approved Groundwater Monitoring Program (GWMP). WCPL may expand its existing groundwater monitoring network by utilising specific exploration boreholes. The requirement to convert any exploration hole over to a groundwater monitoring bore will be subject to further determination from WCPL's groundwater specialist and consultation with DPI-Water in regards to licensing.

An exploration report will be provided to the DRG annually as part of the Annual Review process.

2.3.2 Construction

The majority of the existing Mine facilities have been constructed, including the office administration complex, bathhouse and employee carpark, ROM pads, underground portal areas, coal handling preparation plant (CHPP), products stockpiles, coal conveyors, rail spur, rail loop and rail loading infrastructure (**Figure 2**). For the term of this MOP, all existing approved infrastructure will be utilised including:

- Main administration/bathhouse building and associated car parking areas;
- Electrical supply;
- Water management system;
- Bates South In-pit portal entries;
- Underground support facilities in the In-pit area, including workshop, Control Room, Crib Room, ablution building and hardstand area;
- In-pit conveyor to underground ROM stockpile;
- In-pit ventilation fans;

- Open cut haul roads;
- Open cut workshop;
- Coal handling and preparation plant;
- Coal loadout and rail line infrastructure; and
- Hunter Pit tailings emplacement area.

Construction activities currently planned, within the MOP term (i.e. outside of the normal development activities associated with mining including progressive development of water management infrastructure and light vehicle access tracks) will include:

- Construction at the South Bates Underground Extension Mine;
- Water management structures;
- Homestead and In-Pit Tailings Dam;
- North East Tailings Dam capping;
- Montrose Water Storage Dam⁴;
- Maintenance of the North Wambo Creek Diversion;
- Montrose Tree Screening Project;
- South Dam Remediation;
- Gas Drainage System (SBU and SBUE); and
- Subsidence remediation.

2.3.2.1 South Bates Underground Extension Mine

Proposed new infrastructure for the term MOP will be primarily associated with the SBUE mine. The majority of the infrastructure and construction activities will occur within the Bates South open cut area (see **Plan 3A – 3C**) during 2018 and include, but not limited to:

- Bench and pad preparation and drainage;
- Portal entries from the Bates South highwall, highwall meshing, adits, spiling & support;
- Electrical supply substation;
- Ventilation fan relocation;
- Compressors and associated shed (including concrete foundations);
- Conveyor and ROM pad installation construction;
- Extend fibre and power; and
- Setup communications (PABX & UG phone system).

⁴ The Montrose Water Storage Dam was approved under MOD11. The construction of the dam during the MOP period remains subject to further feasibility studies and at this stage is planned for 2023 (beyond the terms of this MOP).

2.3.2.2 Water Management Structures

WCPL operate under an Erosion and Sediment Control Plan (ESCP). A number of water management structures, including diversion drains, sediment dams, sediment fencing, draining lines and other associated structures may be required throughout the life of the mine. Monitoring and maintenance of all water management structures is outlined in the ESCP (**Section 3.3.5**).

Consultation with the DRG regarding additional water management structures, if required during the MOP term, will be completed to determine if revisions to the MOP Plans are necessary.

2.3.2.3 Homestead Pit Tailings Dam

WCPL will also commence works to establish new tailings facilities in the former open cut voids of the old Homestead In-Pit areas in Q1 2018. Previously, the Homestead area provide portal access to the NWU mine. Sealing the mine entries in the Homestead Pit was completed in March 2016.

2.3.2.4 North East Tailings Dam Capping

A Section 101 of the *Coal Mines Health and Safety Act 2002* was issued to WCPL on the 10 September 2009 for the discontinuance and decommissioning of the North East Tailings Dam (NETD). The capping and monitoring process as detailed in the Section 101 Application was carried out until early 2012 due to slower than expected progress and safety concerns accessing the NETD. The capping project was subsequently placed in a care and maintenance phase whilst alternate capping strategies were investigated.

WCPL is re-evaluating the design and capping options (including displacement capping methodologies) to identify new strategies or technological advancements that could be used to improve the success and decrease the time to cap NETD. A number of options are currently being considered by WCPL; however these options to date are unproven in the coal industry (and Australia) and are being evaluated for viability as well as options for a traditional capping strategy.

WCPL anticipate undertaking further trials, subject to a detailed peer review for adequacy, in regards to alternate methods of capping the NETD during the MOP term. Further information regarding the method proposed for capping under consideration for the NETD will be provided in subsequent MOP amendments and reported in the Annual Review. WCPL anticipate submitting a *High Risk Activity Notification* in Q1 2018 to commence capping of the NETD, in consultation with DRG's Mine Safety Officer.

WCPL submitted the *Wambo Coal North East Tailings Dam Rehabilitation Strategy - November 2016* (NETDRS) to the DRE for approval on the 22 November 2016. The NETDRS was submitted in response to a condition from the MOP Amendment C approval. In March 2017 the DRE provided confirmation that NETDRS could not be approved, as the final landform was not consistent with the current development consent conditions for maximum emplacement heights. As a result, WCPL was required by the DRE to resubmit the NETDRS by the 31 May 2017.

As an alternate capping method, WCPL commenced a trial using secondary flocculation⁵ back in July 2016 with a flocculation plant located on the crest of the Hunter Pit Tailings Dam (HPTD) embankment. The trial consisted of a cell within the HPTD. The undrained shear strength data for secondary flocculated tailings in the trial cell as measured on site with a hand shear vane on 2 March 2017 ranged from 30kPa up to about 350kPa (Fitton, 2017).

⁵ Secondary flocculation is the process of adding more flocculant to the tailings slurry at (or near to) the end of the pipe to the tailings storage facility. It is sometimes referred to as "pipe-head flocculation", "Inline flocculation" or "Enhanced Tailings Disposal (BASF)". This further addition of flocculant causes more agglomeration of tailings particles, and more release of water from the slurry. The main benefit from this process is that greater densities and shear strengths are achieved in the deposited tailings.

With the success of the HPTD trial, WCPL are developing a capping design viability using intermittent disposal methodology of layering 200mm of secondary flocculated tailings at a time. Each 200mm layer of flocculated material deposited will be allowed to dry, to finally form a layered crust approximately 3m thick as part of the capping final design.

As recommended by WCPL's tailings consultant (Fitton 2017), Cone Penetration Testing (CPT) will be undertaken to understand the geotechnical characteristics of the tailings over the full depth of the facility, over a multiple location testing regime in both NETD and the HPTD facilities. This testing will enable a final capping design to be prepared that contains far fewer critical assumptions.

The following is a summary of key project milestones proposed by WCPL regarding the above mentioned method to cap both NETD and HPTD, they include:

- CPT testing of NETD and HPTD in Q1 2018;
- Finalise capping design for NETD and HPTD in Q1 and Q2 2018;
- Capping Works - commence intermittent disposal of double flocculated tailings in NETD and HPTD in Q2 2018; and
- Capping Works – completion of intermittent disposal of double flocculated tailings in NETD and HPTD will occur outside of the MOP Term.

A detailed summary of the progression of the CPT testing, capping design and outcomes from the intermittent disposal of double flocculated tailings in NETD and HPTD will be provided in the Annual Review.

2.3.2.5 Ancillary Infrastructure

During the MOP term, WCPL may need to construct or remove ancillary infrastructure including water management features (e.g. bores, pipelines, pumps, drains, bunds, sediment dams and light vehicle roads), environmental and operational monitoring equipment, electricity supply, communication towers and in-pit facilities. Consultation with the DRG will be undertaken accordingly to determine if a MOP amendment is required in regards to additional ancillary activities not described above.

2.3.2.6 Maintenance of the North Wambo Creek Diversion

During the MOP term general erosion and rehabilitation maintenance works will continue, as required, along sections of the North Wambo Creek Diversion (NWCD) (Domain 7).

Specific rehabilitation maintenance works have been identified in sections of Stage 2 and Stage 3 of the diversion.

In 2018, Wambo Coal, in consultation with the NSW Soil Conservation Service will prepare and commence implementation of a detailed 5 Year NCWD Rehabilitation and Maintenance Plan. The Plan will be developed in consultation with DRG.

Rehabilitation maintenance works will be undertaken annually throughout the MOP term, including:

- Weed management (particular focus on *Galenia pueescens*) to control this noxious weed;
- Repair areas of erosion;
- Re-seeding with selected native pasture and tree species;
- Revegetation trials with native grass species in selective areas of the diversion to assist in controlling weeds; and
- Collection of native grass seeds within pasture areas on adjacent WCPL owned pasture lands.

2.3.2.7 Montrose Tree Screening Project

WCPL have implemented the Montrose Tree Screening project along a section in the north western portion of the WCPL owned Montrose Property, adjacent to Golden Highway. Maintenance and re-establishment of the tree screen will occur in 2018. The tree and shrub species to be planted are consistent with the woodland corridor species as identified in **Table 16**.

2.3.2.8 Subsidence Remediation

WCPL monitor and record the various subsidence related surface impacts from its underground operations on WCPL owned land. A record of surface related impacts and the results of the subsidence remediation are provided in the Annual Review.

Subsidence remediation works during the MOP term will include remediation of impacts (mainly surface cracking) within areas of existing pasture (Domain C) and native vegetation (Domain B), repairs to internal access tracks (where required) and repairs to the North Wambo Creek Diversion as a result of mining activities by SBU and SBUE (Domain 7).

WCPL will also undertake subsidence remediation works at an adjacent property (Kharlibe) within CL397 and CCL743 that was undermined by the Homestead Underground Mine (**Plan 2**). To assist with addressing the rehabilitation obligations under the *Mining Act, 1992*, WCPL proposes the following:

- WCPL will prepare a draft subsidence remediation plan that outlines rehabilitation objectives, timing of remediation activities and quantitative criteria to assess rehabilitation.
- WCPL will provide the draft subsidence remediation plan to the landholder in the first half of 2018 and will provide a 4 week period for the landholder to provide comment.
- Within 2 months of receiving feedback from the landholder, WCPL will incorporate all reasonable and feasible requests and will submit the draft subsidence remediation plan to the DRG.
- It is understood that the DRG will seek written feedback from the landholder on the draft subsidence remediation plan;
- It is understood that the DRG will commission an independent expert to peer review both the draft remediation plan and the written feedback from the landholder to inform the preparation of a final remediation plan.
- Once signed off by the DRG, the final remediation plan will be included in this MOP.

2.3.2.9 Montrose Water Storage Dam

On the 18 January 2013, MOD 11 was approved by the DP&E. This modification comprised the construction and operation of the Montrose Water Storage Dam and associated supporting infrastructure. The Montrose Water Storage Dam would be a “turkey’s nest” style dam located to the south-west of the approved open cut limit (**Figure 2**) and would have a nominal capacity of approximately 1,500 million litres (ML).

At this stage, commencement of construction of this dam is anticipated in 2023 (beyond the terms of this MOP). If construction of the dam is brought forward, WCPL will consult with the DRG regarding a MOP amendment.

2.3.2.10 Gas Drainage System (SBU and SBUE)

In 2016, WCPL commenced installation of a gas drainage system for the SBU (Wambo) to provide for pre-mining gas drainage and goaf gas discharge to reduce the gas content in the coal seam to levels suitable for longwall operations. A similar gas drainage system may be installed for the SBUE.

2.3.3 Open Cut Mining Operations

2.3.3.1 Open Cut Mining Equipment Fleet

Open cut mining during the MOP term is to be carried out primarily with dozers, loaders, hydraulic excavators and trucks. The equipment is sized to provide maximum flexibility and minimise coal losses. The estimated number of each equipment type to be used during the MOP term is presented in **Table 9**; however this may vary during the term of the MOP based on production requirements.

Table 9 Open Cut Mining Fleet

Mining Equipment Description	Make and Model	Number of Fleet
Excavators (overburden/coal)	Komastu PC5500	5
	Hitachi EX2500	1
Haul Trucks (overburden/coal)	Komastu 930	11
	CAT 793	16
	CAT 789	4
Dozers (open cut pit/product stockpile)	Cat D10	9
	Cat D11	3
Front End Loaders	Le Tourneau L1350	1
	CAT 992D	1
	CAT 980	2
Graders	CAT 16M	2
	CAT 24M	1
Water Trucks	CAT 777F	4
Drill Rigs	Drilltech D40K	1
	Reedrill SK50	1
	Drilltech D75K	1
Tyre Handler	Omega 16-12	1

2.3.3.2 Open Cut Mining Sequence

The Open Cut mine has been divided into a number of 'Pits'. The main pit is called the Montrose Pit. Montrose Pit has been divided into Montrose West Pit and Montrose East Pit. Each Pit is generally divided into strips (approximately 100m wide) and blocks which are orientated to suit the sequence of mining, which is influenced by seam dip, seam structures and strip ratio.

Mining in the South Bates Extended Pit (Roses Pit) will be completed during 2018 with the subsequent void becoming a mine water storage facility.

Mining in Montrose West Pit for 2018 is focussed on removal of material to the south of the ridgeline and steadily progressing in a northerly direction towards the Montrose East Pit. The majority of the waste rock from this pit will be used to backfill the Montrose West void.

Montrose East Pit will also be further developed in 2018, to allow mining of lower ratio reserves. Waste rock dumps will be developed out of pit to screen mining operations, and later used to fill the advancing void.

Two minor areas subject to a dozer push operation will be targeted in 2018 in Montrose West and in Homestead East.

The indicative mining schedule and sequence of open cut mining operations will be undertaken during the MOP term is illustrated in **Plans 3A – 3C** and identified Table 10.

Table 10 Mining Schedule and Disturbance during MOP Term

Open Cut Planned Disturbance (ha) & Mining Schedule	2018	2019	2020	Summary 2018-2020
	Area (ha)	Area (ha)	Area (ha)	Area (ha)
Montrose Pit	79.3	17.84	23.5	120.64
Glen Munro Pit		3.4		3.4
South Bates Extension	2.8			2.8
Total	82.1	21.24	23.5	126.84

2.3.3.3 Vegetation Clearing & Topsoil Removal

Prior to the commencing of mining areas in the open cut, pre-strip operations will be conducted to remove vegetation and topsoil. Approximately 126.84 ha of vegetation would be progressively cleared over the MOP term (Table 10).

Further topsoil removal and vegetation clearance procedures are provided in **Section 3.3.5**. The proposed disturbance areas during the MOP term, necessary for mining and construction related activities are provided on **Plans 3A – 3C**. The mitigation measures relevant to vegetation clearance activities include the following:

- Completion of SDP's;
- Wherever practicable, existing native vegetation will be retained and vegetation clearance avoided;
- Archaeological clearance in accordance with Heritage Management Plan (HMP) will be obtained from WCPL archaeologist prior to releasing the area for work;
- Sediment controls implemented are consistent with the ESCP;
- Follow the Vegetation Clearance Protocol (VCP), to minimise the impact of the Mine vegetation clearance activities on flora and fauna. As a component of the protocol, pre clearance surveys will be completed (where necessary) to identify habitat trees and threatened fauna species. The proposed clearance areas will be demarcated;
- Where available, topsoil resources will be identified, stripped and stockpiled for later use in rehabilitation; and
- Where vegetation clearance is undertaken, timber will be mulched and either used as a soil conditioner or timber salvaged for habitat creation on rehabilitation areas where practicable.

Due to the known variability and distribution of the soils at WCPL, the concept of soil complex units is used to identify the soil types, and provide guidance on appropriate stripping depth. Expected topsoil volumes stripped (**Table 12**) during the MOP term are provided in **Section 2.3.11**.

Surface Disturbance Permit Procedure

WCPL has implemented a Surface Disturbance Permit (SDP) procedure and checklist (**Appendix 3**). The SDP requires the approval of the Environment and Community Manager (or delegate) prior to any land disturbance and clearing activities taking place. The SDP aims to identify any environmental issues such as cultural heritage sites, flora and fauna communities, threatened species, surface drainage and the identification of any seed or timber resources that can be salvaged. The SDP procedure is completed prior to any surface disturbance being permitted on:

- WCPL owned land;
- United Collieries' owned land covered by WCPL's mining lease; and

- Privately owned land where the disturbance is subject to agreement with the landowner. An Exploration Site Permit (ESP) may substitute the standard SDP if the disturbance is related to exploration activities.

Surface disturbance at WCPL includes, but is not limited to:

- Felling of trees on undisturbed, disturbed or rehabilitated land;
- Grading of new access roads and maintenance of existing access roads where the footprint of disturbance is greater than the original;
- Pushing up or removing topsoil on any land whether undisturbed, disturbed or rehabilitated;
- Dumping over any undisturbed, disturbed or rehabilitated land; and
- Construction of any earthworks across undisturbed, disturbed or rehabilitated land.

The following requirements (but not limited to the below), may be addressed (dependent on activity) by the SDP, prior to the Environment and Community Manager (or delegate) granting approval:

- A plan with proposed area for disturbance delineated;
- Pre-clearance surveys completed for both ecological and heritage assessments;
- An erosion and sediment control plan;
- Topsoil management measures;
- Noise management measures;
- Dust management measures; and
- Light management measures.

Salvage and Re-use of Materials

Where practicable, clearing operations required for the open cut will be managed to re-use the cleared timber. Timber resources that can be salvaged will be identified as part of the SDP procedure.

Cleared timber suitable for fence posts and habitat for fauna will be set aside and salvaged where possible. Habitat features such as logs and hollows collected during a clearance campaign may be utilised in rehabilitated and RWEPA areas to augment habitat features for fauna.

2.3.3.4 Drilling and Blasting

The majority of overburden material cannot be ripped or excavated by mobile plant; therefore blasting techniques using ammonium nitrate based explosives loaded into blast holes, drilled with rotary drills will be undertaken. Blasting activities will also be required for the purposes of excavation blasting to develop drift access to coal seams for underground mining.

WCPL have developed a Blast Management Plan⁶ (BMgtP) to outline blast management and mitigation strategies, procedures, controls and monitoring programs that are to be implemented at the Mine. The BMgtP was prepared to satisfy:

- Development consent DA 305-7-2003, Schedule 4, Consent Conditions 11,12,13,13A, 14,15,16,17,18,19, 20, 20A, 63, 64, 65, 66, 67 & 68;
- Development consent DA 305-7-2003, Schedule 6, Consent Conditions 3 & 4;
- Development Consent DA 177-8-2004, Schedule 4, Consent Conditions 8, 9 & 10;

⁶ Condition 20, Schedule 4 of DA305-7-2003.

- Environment Protection Licence No.529 (EPL 529) Condition L5; and
- *Australian Standards (AS) 2187.2:2006 Explosives – Storage and Use – Use of Explosives.*

The approved blasting hours for the Mine are between 9.00 am and 5.00 pm Monday to Saturday inclusive.

No blasting is allowed on Sundays, Public Holidays, or at any other time without the written approval of the Secretary of the DP&E.

A maximum of three blasts events per day (unless an additional blast is required following a blast misfire), and fifteen blasts per week for all operations at the Mine.

WCPL must develop a Traffic Management Plan⁷ for blasting within 500 metres of a public road that has been prepared in consultation with the Roads and Maritime Service (RMS) and Singleton Shire Council (SSC).

Exceedance of the overpressure limit of 115 dB at the nearest sensitive receiver should be limited to a maximum of 5 percent (%) of the total number of blasts (over a period of 12 months), and should not exceed 120 dB at any time.

Exceedance of the ground vibration limit of 5 mm/sec at the nearest sensitive receiver should also be limited to 5% of the total number of blasts, and should not exceed 10mm/sec at any time. For more details about blasting and blasting management measures refer to **Section 3.4.9**.

2.3.4 Rock/Overburden Emplacement

The open cut operations are expected to produce approximately 640Mbcm of waste rock (or overburden material) during the life of the Mine (WCPL, 2003). Only a limited amount of waste rock will be produced from the underground operations. The overburden and interburden waste rock materials comprise mudstones, siltstones, sandstone, shale and conglomerates (WCPL, 2003).

Waste rock material is progressively placed back in-pit once the coal has been mined. A combination of temporary and permanent out-of-pit waste rock emplacements are located adjacent to the open cut mining operations (**Plans 3A – 3C**). Mine waste rock emplacements behind the advancing open cut are progressively constructed to form the final landform. Some of the waste rock is also utilised to construct internal walls for the tailings emplacements and for capping.

The coarse reject material is selectively handled and co-disposed of with waste rock in open cut voids or would be used as bulk fill in the covering and rehabilitation of tailings materials (WCPL, 2003). Coarse reject material is dispersed throughout the overburden within the mine waste rock emplacements to manage its geochemical characteristics.

Rehabilitation of mine waste rock emplacements would be progressive and would be undertaken as soon as practicable. Landform reshaping consists of re-contouring overburden dumps to the designed shape for final rehabilitation.

Reshaping results in a stable landform incorporating slopes and drainage which blend in with the surrounding natural topography. Slope stability is integral to rehabilitation design and the objective during rehabilitation planning is to design all slopes to a gradient of 10° or less (1V:5.7H). Slopes steeper than 10° may be necessary in some locations to ensure rehabilitation merges seamlessly with adjacent undisturbed land.

Mine waste rock emplacements would cover an area of approximately 1,300 ha and be rehabilitated to a final landform up to 160m AHD. Where long slopes are present, contour drains or deep staggered

⁷ Condition 80, Schedule 4 of DA305-7-2003.

rips would be established. Waste rock emplacements will be constructed in 15 to 20 metre lifts and shaped to the final landform profile when completed.

The surface of mine waste rock emplacements would be constructed to form a pattern of ridges and valleys. The valley areas would be shaped into a network of constructed drainage structures. Mine waste rock emplacement surfaces would be formed to maximise rainfall absorption and to minimise the requirement for artificial drainage structures. Mine waste rock emplacement berms would generally be reverse graded with perimeter bunds constructed as necessary.

Natural slopes commonly evolve to form an 'S' shape as a result of natural erosion and deposition processes. Mine waste rock emplacement slopes would generally be constructed in profile to form an 'S' shape with the upper 20 to 30% being convex and the lower 70 to 80% being concave.

Until an adequate vegetation cover is established, heavy rainfall may cause erosion, resulting in a dissected land surface, resource loss and the need for expensive remedial treatment. Therefore, slope length is reduced by fit for purpose designed structures such as contour drains, to intercept and divert water off the slopes. The structure(s) principle aim is to drain water safely from the landform, via a sediment detention structure if the water is to be discharged from the mine water management footprint.

Once bulk reshaping is completed, the landform is ripped to approximately 200-300 mm and then the final trim and rock raking are undertaken. The ripping loosens up any near surface strata within the landform that have been compacted during placement, aiding root penetration during vegetation establishment. The final trim smooths out any washouts, rough edges, temporary access tracks, local steep topography and prepares the surface for revegetation.

Rock-raking removes exposed surface rock greater than 200 mm in diameter. This raking is usually done along the contour, leaving a textured surface that assists with erosion minimisation until vegetation can be established.

Overburden characterisation will be completed to determine appropriate ameliorants and rates of application. Ameliorants, if required, are applied to the trimmed overburden surface. Overburden sampling and laboratory analysis will be undertaken to gain an understanding of the type and rate of ameliorant required to treat the overburden.

Gypsum is commonly applied at a rate of approximately 5-10 tonnes per hectare (t/ha) depending on laboratory soil results/analysis to assist in treating sodic, poorly structured or heavy clay material. Lime (calcium carbonate) may also be applied to treat hotspots of low pH (acidic) overburden if encountered; however, acidity has not historically been a problem with overburden at the Mine.

Following shaping of the landform the mine waste rock emplacements would be covered with approximately >100 mm of topsoil sourced from soil stockpiles or freshly stripped open cut mining areas. Site preparation works following the placement of topsoil would include chisel ploughing or deep ripping along contour, depending on the vegetation type to be established.

Mine waste rock emplacements would be progressively revegetated with a pasture cover crop and endemic woodland shrubs and trees planted on ridgelines and other selected areas, consistent with the proposed revegetation strategy as described in **Section 2.3.4**.

Material identified having potential spontaneous combustion risks will not be used in rehabilitation works. This material, if identified, will be covered to a depth of at least 5m below the final landform RL using inert waste rock material.

Likewise, coarse reject emplacements integrated into the landform will be covered to a depth of at least 2m below the final landform RL using compacted inert waste rock material.

Overburden material exhibiting hostile characteristics (acidity, excessive alkalinity, sodicity, etc.) will be identified during material characterisation of the final landform and isolated from vegetation root zones and areas of potentially high surface runoff (i.e. this material not be used in the final 2m of the final landform RL).

A dump mass balance was performed, based on a material swell of 1.25, to give the landform as shown in **Plan 5**.

Overburden removal is carried out mostly by excavators and haul trucks with the waste rock material hauled to open cut voids or waste rock emplacements. Approximately 26.7 Mbcm of waste rock was excavated during the 2016 reporting period.

Overburden removal will be carried out typically by 500t excavators and a 290t or 220t truck fleet. Some overburden material will be loaded with the 250t excavator and loaders. The overburden material will generally be hauled and dumped in pit or on existing dump surfaces. Waste from the Montrose Pit (east) has been scheduled to report to an out-of-pit dump which will be adjacent to the pit limit (see **Plans 3A – 3C**).

The approximate annual volumes of stripped topsoil material, overburden, ROM coal, processing waste and product coal during the MOP term are provided in **Table 12**.

A small amount of overburden material above the Wambo and Whynot seams will be moved with dozers employing a combination of cast blast and dozer push. This overburden material will be disposed of in the immediately adjacent mined out strip. The stripping sequence will be planned so as to minimise any traffic on the exposed coal seams.

The disposal sequence of the overburden material is designed to form ongoing and continuous rehabilitation of the mined out areas. As no acid forming strata has been identified, dumping will be designed around the achievement of the most cost effective dump sequence.

The majority of overburden material from Montrose Pit (west) will be placed into the void created by mining. Some material from Montrose Pit (west) was placed into the Bates Pit void, and used to construct a pad for underground access to Whybrow seam within SBU.

Bates South Pit waste is primarily used as a pad for the underground access to the SBU. The initial overburden material from the Montrose Pit (east) was hauled out of pit to create a visual bund on the northern side of the operation. Now the bund is completed, all Montrose East overburden material will report in pit.

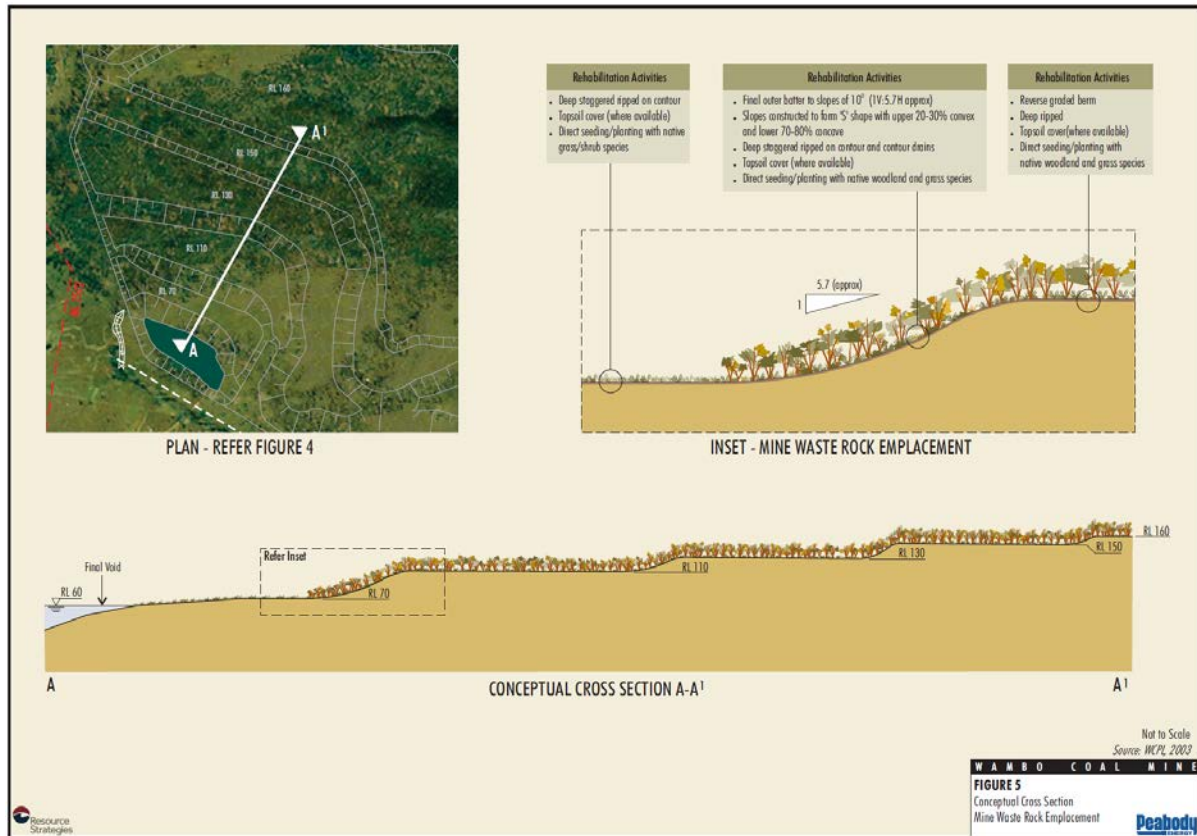
2.3.4.1 Final Landform Concepts

The final landform will consist of a single, broad ridgeline with a south-east to north-west alignment, which reaches approximately 160 metres (m) Australian Height Datum (AHD). Key features of the final landform include:

- Rehabilitated waste rock emplacements, infrastructure areas and tailings disposal areas which include woodland corridors to facilitate fauna movement across the rehabilitation areas and provide linkages with existing remnant vegetation and the Wollemi National Park;
- Two final voids located on the western extent of the final landform; and
- Permanent water management features including diversions and contour drains and some permanent ponds (located on the eastern extent of the final landform) to integrate landform drainage with the surrounding catchment.

Figure 7 illustrates the final landform concept and the revegetation strategy comprising a mixture of pasture and woodland communities. A conceptual cross section of a portion of rehabilitated mine waste rock emplacement is provided in **Figure 4**.

Figure 4 Conceptual Cross Section Waste Rock Emplacements



2.3.4.2 Coal Removal

Coal and partings operations will include:

- Coal will be mined with the 500t and 250t hydraulic excavator or front end loaders loading direct into 180t to 290t trucks;
- Thinner coal seams will be ripped and dozed into suitably sized stockpiles prior to loading;
- Coal in the floor will be dozed to the hydraulic excavator concurrent with the mining of the last pass thus minimizing dilution and/or losses at the floor of the coal;
- Parting bands will be removed by ripping with a track dozer and pushing into stockpiles prior to loading by the hydraulic excavator;
- Upon removal of each coal and parting band a dozer or grader will clean the floor to maximise coal recovery; and
- Utilising this coal mining fleet will eliminate, in most circumstances, the need for blasting of the coal. ROM coal is transported by haul trucks along internal haul roads to the ROM pad where it is directly dumped into ROM hoppers for crushing or is temporarily stockpiled and then rehandled to the ROM hoppers.

2.3.5 Processing Residues and Tailings

ROM coal is crushed and washed in the CHPP which operates at a rate of up to approximately 1,800 tph of ROM coal feed. A product coal stockpile with an approximate capacity of 500,000 t is used to stockpile product coal, prior to reclaim and loading to trains for transport off-site.

The CHPP operates up to 24 hours per day, 7 days per week and during the 2016 calendar year approximately 9.4 Mt of ROM coal was processed at the CHPP, producing approximately 6.3 Mt of product coal.

Coarse reject material and tailings produced by the CHPP require management at the Mine.

Approximately 6.79 Mt of coarse reject material will be produced over the MOP term from the washing of open cut and underground ROM coal and will primarily comprise minor quantities of coal as well as sandstone, siltstones, shales, conglomerates and mudstone (as predominantly gravel and cobble sized fragments). The coarse reject material produced from the CHPP is expected to be geochemically similar to that currently produced and will continue to be selectively handled and disposed of in waste rock emplacement areas or used as bulk fill in the covering and rehabilitation of tailings materials. The coarse coal reject material from the CHPP is hauled back to the mining operation and is dispersed throughout the mine waste rock emplacements to manage its geochemical characteristics.

Tailings Disposal Areas

Approximately 1.2 Mt of tailings will be produced over the MOP term from the washing of open cut and underground ROM coal. The tailings management procedures developed for the WCPL to address the physical characteristics of tailings generated to date will continue to be. Approximately 24.5 Mt of tailings (dry basis) are expected to be produced over the life of the Mine (WCPL, 2017).

Approximately 80-85% of the CHPP reject is in the form of coarse reject. The remainder is fine reject (tailings). The tailings are slurry with 18 to 20% solids, the solids comprising very fine stone and clay material. Tailings will be pumped as slurry to approved purpose-built tailings dams constructed within mined out voids from where supernatant waters will be recovered to the mine water management system for dust suppression or reuse in the CHPP.

Tailings from the CHPP will be directed to the Hunter Pit Tailings Dam (HPTD) until the end of 2017.

WCPL will also commence works to establish a new tailings facility in the former void of the old In-Pit in Q1 2018. Previously the Homestead Pit and In-Pit areas provided portal access to the NWU mine. Sealing the mine entries⁸ in the Homestead In-Pit and In-Pit areas was completed in March 2016. Tailings will be alternated between the In-Pit, HPTD and NETD in 2018.

Tailings produced at the CHPP primarily comprise carbonaceous shale, sands and clay materials (WCPL, 2003). The tailings are pumped as slurry to the approved⁹ final void tailings facility. Once tailings disposal areas have reached capacity and allowed to consolidate, decommissioning will commence with a progressive covering of coarse rejects and/or waste rock material using a combination of encapsulation and incorporation when the surface of the tailings dam is deemed trafficable and safe.

The final capping of inert overburden material will be to a minimum depth of cover of 2m (or greater subject to final capping requirements), prior to final profiling and rehabilitation, to restrict oxygen and water ingress to the underlying tailings and prevent salts from rising to the soil surface.

The engineered cover design would consider site topography, prevailing climatic conditions and the availability of suitable fine textures material (i.e. highly weathered mine water rock) as a cover material. The capping process creates a final landform that is stable and can be rehabilitated using

⁸ In accordance with *MDG6001 Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams (February, 2012)*.

⁹ As required by the relevant Section 100 Approval as issued under the *Coal Mines Health and Safety Act 2002*.

the same rehabilitation concepts and methods as for the mine waste rock emplacements. Final rehabilitation of the tailings emplacement areas will occur when the dams have been capped and deemed stable and suitable for rehabilitation to occur.

Currently there are a number of tailing facilities in various life stages at the commencement of this MOP term, including:

- North East Tailings Dam (Decommissioned. Commencement of alternate capping method trial in 2018 until completed in 2020) (refer to **Section 2.3.2.7**);
- Hunter Pit Tailings Dam (Currently active but scheduled for decommissioning in 2018. Commencement of alternate capping method trial in 2018 until completed in 2020) (refer to **Section 2.3.2.7**); and
- In-Pit Tailings Dam (Commissioning expected in 2018 for the In-Pit subject to relevant approvals from government authorities).

Specific WCPL personnel have completed training to undertake inspection of all tailings facilities. These routine inspections are completed weekly. Other routine inspections include annual independent inspections as required by the relevant Dams Safety Committee (DSC) approval.

2.3.6 Underground Mining Operations

2.3.6.1 Underground Mining Equipment Fleet

Underground mining at WCPL during the MOP term will employ a longwall operating system. Mining equipment to be utilised during the MOP term at the SBU and the SBUE mines (within the Whybrow and Wambo Seam) will include the following:

- Construction fleet items will include cranes, low loaders, backhoes and other typical construction equipment.
- Major underground development equipment will include:
 - Up to four Joy 12CM30 5.4m single pass continuous miners;
 - up to four electric shuttle cars with 15 t payload;
 - two stamler feeder breakers to size coal produced during development;
 - four auxiliary fans (21.5 m³/s);
 - eight Load Haul Dump (LHD) machines;
 - nine personnel transporters (PJBs or SMVs);
 - power reticulation and distribution system (11 kV/1 KV); and
 - mobile pumping stations and face dewatering system.
- Major longwall panel equipment will include:
 - longwall supports rated to 1,000 t capacity (1.75 m width);
 - AFC/BSL design of 2,000- 3,000 tph;
 - longwall shearer;
 - maingate equipment;
 - monorail system for supply of services;
 - hydraulic pumps and shearer water pumps; and

- longwall electrical transformers.
- The main headings conveyor will be approximately 1,200 m in length and will re-use the existing trunk conveyor from the sealed North Wambo Underground Mine and will comprise:
 - 2,500 T/Hr (Peak 3,000 T/Hr) rating;
 - 3 x 320 kW driveheads;
 - 5 m/s belt speed;
 - 1600 ply belt; and
 - PLC Control.
- The development panel conveyors will each be approximately 2,000m in length and will re-use the existing gate road conveyors at a capacity of approximately 1,500 tonnes/hr, including:
 - 2 x 600 kW driveheads;
 - 4.5 m/s belt speed;
 - 1500 ply belt; and
 - loop take up- 13 bays, 240 m belt storage.
- The main gate longwall conveyor will be approximately 2,000m in length and will comprise:
 - 1,800 – 2,200 t/hr rating;
 - 2 x 600 kW driveheads; 4.5 m/s belt speed;
 - 1500 ply belt;
 - loop take up- 13 bays, 240 m belt storage;
 - 1 new tripper drives; and
 - 2 of 2 x 600 kW tripper drives.

Surface conveyors will be required to transport coal from the South Bates bench on the Whybrow and Wambo seam level to the ROM pad adjacent located at previous Wollemi Underground Mine ROM pad.

Mobile surface fleet associated with the SBU and SBUE mine will include a front end loader and standard open cut haul trucks (777 or 785 dump trucks) that will be utilised occasionally from the open cut fleet to internally transport coal to the CHPP along the open cut main coal haul road.

2.3.6.2 Underground Mining Layout

The approved SBU (Wambo Seam) mine consists of three 222 - 240m longwall panels, with the panels oriented south-west to north-east. Longwall panels LW14, LW15 and LW16 will be developed off Main Headings developed off the Bates South East highwall. Longwall panels LW14, LW15 and LW16 are approximately 976 m, 1105 m and 1345 m in length. The shortened longwalls do not extend to the southern side of Stony Creek (**Plan 2**).

The SBUE mine consists of 250 m wide longwall panels, with the panels oriented south-west to north-east. During the MOP term, longwall panels LW17 to LW21 will be developed off Main Headings developed off the Bates South East highwall. Longwall panels LW17 to LW21 range from approximately 1,510 to 1,720 m in length. The shortened longwalls do not extend to the southern side of Stony Creek (**Plan 2**).

2.3.6.3 Underground Mining Method

WCPL primarily use Joy Mining Longwall equipment, including the longwall operating system. The longwall panels are formed by driving two sets of gateroads (the tailgate and maingate roads). Each gateroad requires two roadways (headings) to be driven parallel to each other (approximately 31 m apart). One of the roadways is used for personnel and materials access and fresh air intake ventilation while the other is used for coal clearance and return air ventilation. The roadways are developed using Joy 12CM30 continuous miners.

The headings are connected approximately every 120m by driving a cut through from one heading to another. This forms pillars of coal along the length of the gateroad. The tailgate and maingate roads are separated by the 222m-252m wide longwall panel. The maingate roads and tailgate roads are then linked together by driving an installation road and bleeder road at the inbye end of the longwall panels.

Generally roadway development height is 2.9m, while the average extraction height across the face will range from 2.2m to 2.9m depending on the seam thickness.

2.3.6.4 Underground Mining Sequence

SBU mine (Wambo Seam)

Longwall mining of LW14 commenced in July 2017 and will be completed during February 2018. Longwall mining of LW15 is scheduled to be completed in May 2018 (**Plan 3A**). Longwall mining of LW16 is scheduled to be completed in August 2018. (**Plan 3A**).

SBUE mine (Whybrow Seam)

Longwall mining of LW17 is scheduled to commence in August 2018 and longwall extraction of these longwalls would occur throughout the term of the MOP (**Plans 3A – 3C**).

2.3.7 Waste Management

WCPL implements a total waste management system (TWMS). The TWMS facilitates the management and disposal of multiple waste streams, including hazardous waste, in accordance with the *Protection of the Environment Operations Act 1997* (POEO Act), *POEO (Waste) Regulation 2005* and the *POEO Amendment (Scheduled Activities and Waste) Regulation 2008*. The TWMS is managed by the Environment and Community Manager, with waste management operations being undertaken by the licensed waste management contractor. Key strategies of the TWMS include:

- Segregation of waste at the source;
- Appropriate transport, handling and disposal of hazardous waste;
- Recycling;
- Reduction in the risk of contaminating non hazardous waste;
- Waste tracking - comprehensive monthly reports detailing volumes, recycling, disposal and transportation of waste; and
- Improved data capture to increase the efficiency and accuracy when reporting.

Sewage is treated on-site at Main Administration Building and CHPP sewage treatment plants. Each sewage treatment plant is maintained by a licensed contractor. Some of the treated effluent is used for irrigation purposes around administration buildings.

Various waste materials are collected and sorted for recycling including paper, cardboard, metals, glass, air filters, oil filters, waste oil, waste grease, oil rags and hydraulic hoses by the Mine's licensed waste contractor.

In the event hydrocarbons have contaminated soil material as a result from spillages for example, the contaminated material will either be removed from site by WCPL licensed waste contractor to an appropriate licensed facility for treatment or removed to WCPL's on-site bioremediation area for treatment. The treated material from the bioremediation area will be disposed of within the Mine's waste emplacement areas, only when the material has been deemed remediated.

2.3.7.1 Hazardous Materials

Hazardous reagents and explosives required for the Mine will be transported in accordance with the appropriate regulations under the NSW *Dangerous Goods (Road and Rail Transport) Act, 2008*. These regulations apply versions of the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code). Explosives, including explosive precursors, will be managed in accordance with the NSW *Explosives Act, 2003* including a Security Plan developed in consultation with the explosives contractor for the Mine. All persons working with or having access to explosives will be licensed in accordance with the *Explosives Act, 2003*. Detonators and boosters are stored on-site in a purpose built compliant facility. Bulk explosives will only be mixed using a Mobile Manufacturing Unit.

Bulk ammonium nitrate (AN) and emulsion are stored on-site during the loading process and mixed using mobile manufacturing plants before being delivered down the blast holes.

Hydrocarbons used on-site for the Mine include diesel, oils, greases and degreaser. Hydrocarbon storage facilities are designed, located, constructed and operated in accordance with *AS 1940:2004*. The storage and handling of flammable and combustible liquids and *NSW Work Health and Safety Act, 2011*. This will include the use of re-locatable self-bunded double skinned storage tanks.

Waste hydrocarbons will be collected, stored and removed by licensed waste transporters. All waste streams are captured by the site's TWMS. The workshop infrastructure includes waste oil extraction equipment for efficient removal of waste oil during machinery servicing. Runoff from the workshop floor and apron, refuelling pads and truck washdown area pass through a purpose built oil/water separator system which is inspected and maintained on a regular basis. Oily water from the oil/water separator is removed from site by WCPL licensed waste contractor.

WCPL operate *ChemAlert*, a comprehensive tracking, storage and chemical information management system. No chemical or hazardous material will be permitted on-site unless a copy of the appropriate Material Safety Data Sheet (MSDS) is available. All chemicals brought on-site will be recorded in a register which will identify the type of product, dangerous goods class, liquid class, hazardous chemical class and the quantity held on-site. The inventory register will also identify the compatibility of materials and the emergency response procedures in the event of a spill.

Chemical storages will be provided within the workshop and storage buildings and will be separated according to chemical type and storage requirements. Notifications, placarding and preparation of safety plans will be in accordance with the *WorkCover Guideline for Dangerous Goods*.

2.3.8 Decommissioning and Demolition Activities

Infrastructure with no ongoing beneficial use will be removed from the site at the completion of the Project. Foundation slabs of certain buildings may be retained for suitable end-use goals in agreement with the relevant authorities and stakeholders. Alternatively, they would be excavated for disposal or buried in a void in an approved manner.

Process reagents and fuels unused at the completion of mining will be returned to the supplier in accordance with relevant safety and handling procedures.

Foundation soils will be chemically tested, contour ripped and chemically ameliorated, as required and in accordance with relevant regulatory requirements. Stockpiled soils will then be applied as necessary

and stabilised. Revegetation would be undertaken with suitable endemic tree species or pastures, consistent with the revegetation strategy (**Section 3.3.7**).

Roads that have no specific post-mining use will be ripped, topsoiled and revegetated. Some access roads may be retained post-mining to enable access and for use in bushfire and other land management activities.

Ventilation infrastructure, including fans and vents will be removed. A detailed plan of each ventilation shaft will be prepared and the sealing/capping procedure determined in consultation with the relevant authorities and other stakeholders. Post-mining, ventilation shafts will be backfilled and sealed in accordance with DRG requirements (currently the *Mine Design Guideline [MDG] 6001 Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams* [NSW Department of Trade and Investment, Regional Infrastructure and Services [DTIRIS] Mine Safety Operations, 2012]).

At the completion of underground mining operations all underground infrastructure (e.g. conveyors and dewatering systems) that can be recycled or reused will be removed. The various drift accesses and portals will be sealed to prevent discharge of waters from the workings as they become flooded by groundwater.

Portals will be sealed (or access restricted) in accordance with DRG requirements (*MDG 6001 Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams* [DTIRIS Mine Safety Operations, 2012]). Box cut areas will be regraded, where necessary, and revegetated using appropriate plant species.

Areas in the vicinity of the rail loop will be revegetated with native species characteristic of the Warkworth Sands Woodland (such as *Angophora floribunda* and *Banksia integrifolia*) to compensate for the removal of a small portion of Warkworth Sands Woodland.

Other decommissioning activities will generally involve capping trials of the North East Tailings Dam and consolidation of Hunter Pit Tailings Dam, once the storage capacity of the tailings dam has been reached (**Section 2.3.2.7** and **Section 2.3.5**).

2.3.9 Temporary Stabilisation

Several waste rock emplacement areas have been identified by WCPL for stabilisation works during the MOP term, commencing with a trial in 2018. The objective will be to stabilise outer batters temporarily in active pit areas with a vegetative cover (e.g. by aerial seeding) to minimise erosion, but primarily to assist in the management of dust. Finalisation of the waste rock emplacement areas will be subject to further assessment of their dust risk potential during the MOP term. Other temporary stabilisation works completed in 2016 included seeding with couch a small area of mine disturbed land adjacent to the South Bates underground haul road.

2.3.10 Progressive Rehabilitation & Completion

To minimise the area of disturbance at any one time, rehabilitation occurs progressively at the Mine of final mine landforms when they become available for revegetation. The mine waste rock emplacements behind the advancing open cut would be constructed to approximate the pre-mining topography or the final landform (**Plan 4**) approved by DA305-7-2003.

Mine waste rock emplacements would be shaped by dozer prior to the commencement of rehabilitation activities i.e. re-profiling, reapplication of topsoil/subsoil and revegetation and soil amelioration activities (**Section 3.3.6** and **Section 3.4.1**).

Rehabilitation activities during the MOP term will be displayed in **Table 11**. At the completion of the MOP term, a total of 144.8 ha will be rehabilitated. Progressive rehabilitation of waste rock emplacement areas within the open cut is identified in MOP **Plans 3A – 3C**.

In addition, WCPL plan to decommission the Hunter Pit Tailings Dam in 2018, under the relevant Section 101 Approval¹⁰ for discontinued use of a tailings emplacement area. It is anticipated that rehabilitation of the Hunter Pit Tailings Dam would occur after the capping phase, during the next MOP term.

As previously discussed, capping trials for the North East Tailings Dam will continue during the MOP term. The method of capping tailings dams, prior to rehabilitation activities commencing, are detailed in **Section 5.3**. Further details regarding the rehabilitation activities during the MOP term are provided in **Section 7** of this MOP.

Table 11 Open Cut Planned Rehabilitation

Open Cut Planned Rehabilitation	2018	2019	2020*	Summary 2018-2020
	Area (ha)	Area (ha)	Area (ha)	Area (ha)
RL160	7.7			7.7
Rug Dump	12.9	23.2		36.1
Barren Zone	16.8			16.8
RL110 Embankment	3.9			3.9
Waterfall Ramp	2.6			2.6
Montrose East	8.6			8.6
Montrose		21.1	42.4	63.5
Bates South Slip Area	5.56			5.56
Totals	58.1	44.3	42.4	144.8

2.3.11 Material Production Scheduled During MOP Term

The indicative mining schedule and sequence of open cut and underground mining operations during the MOP term is outlined in **Section 2.3.3** and **Section 2.3.4** and displayed in **Plans 3A – 3C**. An indicative material production schedule during the MOP term is provided in **Table 12**.

Table 12 Material Production Schedule during the MOP Term

Material Production Schedule during the MOP term				
Material	Unit	2018	2019	2020
Open Cut				
Stripped Topsoil	Mm ³	0.27	0.06	0.07
Rock/Overburden	Mm ³	31.59	26.49	26.59
ROM Coal	Mt	4.46	3.50	3.42
Coarse Reject Material	Mt	1.36	1.00	0.96
Tailings	Mt	0.24	0.18	0.17
Product Coal	Mt	2.86	2.32	2.00
SBU Mine (Wambo Seam)				
ROM Coal	Mt	2.30	-	-
Coarse Reject Material	Mt	0.63	-	-
Tailings	Mt	0.11	-	-
Product Coal	Mt	1.56	-	-

¹⁰ Work Health and Safety (Mines) Regulation 2014 [NSW] Schedule 3 High risk activities.

Material Production Schedule during the MOP term				
Material	Unit	2018	2019	2020
SBUE Mine (Whybrow Seam)				
ROM Coal	Mt	1.48	4.45	3.86
Coarse Reject Material	Mt	0.42	1.26	1.16
Tailings	Mt	0.08	0.22	0.20
Product Coal	Mt	0.99	2.97	2.50

3.0 Environmental Issues Management

3.1 Environmental Risk Assessment

A Broad Brush Risk Assessment (BBRA) workshop for the MOP was undertaken in May 2014. A revision of the sites Environmental BBRA for the site was also completed in May 2016. The BBRA was conducted generally in accordance with the Australian Standard *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines*, and the Peabody *Hazard Identification and Risk Management Standard (PEA-S&H-STD-001.3)*.

The BBRA identified a number of ‘medium and low’ risks¹¹ associated with the rehabilitation and mining operations that may be encountered during the MOP term. **Table 13** provides a summary of key mining and rehabilitation risks identified in the BBRA (identified by shaded cells) and where they are addressed in the MOP.

WCPL have developed environmental management plans (EMP)¹² incorporating the necessary controls to manage environmental risks, as identified through the BBRA process.

Table 13 Key Elements from the BBRA

Key Environmental & Community Aspects Assessed	Potential Consequence and/or Hazard	Mitigation Measures addressed in MOP
Aboriginal Cultural Heritage	Damage or loss of Aboriginal Cultural Heritage	Section 3.4.12
Approvals	Non-compliances with operating approval conditions	Section 1.3
Blasting	Blasting at the mine exceeds criteria or results in a complaint	Section 3.4.9
Bushfire	Fire impacts new revegetation in open cut	Section 3.4.14
Dust/Air Quality	Mine generated dust that exceeds criteria or results in a complaint	Section 3.4.3
Erosion & Sediment Control	Pollution of surface water and breach of environmental protection licence (EPL)	Section 3.3.5
Flora & Fauna	Breach of legislation and site procedures from unauthorised clearing	Section 3.3.7
Green House Gases	Non-compliance with the abatement requirements in the Project Approval	Section 3.4.7
Hazardous Materials & Dangerous Goods	Contamination or pollution events and breach of EPL and legislation	Section 2.3.8 & 3.4.6
Historic (European) Heritage	Damage or destruction of European heritage sites	Section 3.4.12
Land & Property Management	Poor land management practices and loss of community reputation	Section 5.0
Reject Management	Rehabilitation and mine closure impacts as a result from spontaneous combustion and AMD.	Sections 3.3.2 & 3.3.3
Land Contamination	Potential land contamination risk include chemical spills, storage etc.	Section 3.3.19
Monitoring & Reporting	Non compliance with reporting requirements for the Project	Section 8.0
Noise	Mine generated noise that exceeds criteria or results in a complaint	Section 3.4.10
Rehabilitation & Mine Closure	Unstable landform, poor drainage and failure to meet lease relinquishment	This document Section 1.6.1
Spontaneous Combustion	Spontaneous combustion of carbonaceous material	Section 3.3.2
Mine Subsidence	Subsidence impacts compromise final land use	Section 3.3.4 and

¹¹ Note that all residual risks were acceptable/as low as reasonably practicable with the implementation of appropriate controls.

¹² As required by the DA305-7-2003.

Key Environmental & Community Aspects Assessed	Potential Consequence and/or Hazard	Mitigation Measures addressed in MOP
		Section 5.5
Stakeholders	Inadequate consultation leads to negative community perception	Section 1.5
Topsoil	Loss of topsoil resource from poor storage, handling and maintenance	Sections 3.3.5 & 3.3.6
Visual Impact	Poor rehabilitation outcomes and increased mining footprint	Section 3.4.11
Waste Management	Inappropriate waste disposal resulting in a EPL and legislative breaches	Section 2.3.7
Water	Pollution to surface and groundwaters	Section 3.4.4 & 3.4.5

Section 9.0 outlines potential risks and consequences associated with rehabilitation activities. A Trigger Action Response Plan (TARP) has been developed to identify appropriate response measures to manage any potential rehabilitation risk. **Table 35** illustrates how the various rehabilitation risks, management measures and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

3.2 Environmental Risk Management

An Environmental Management Strategy (EMS)¹³ for the existing mining operations has been prepared by WCPL. The EMS has been developed to meet corporate and statutory requirements and was prepared generally in accordance with ISO 14001. The EMS encompasses a range of management plans and monitoring programmes overseen by statutory planning provisions (Figure 5).

Further information regarding how specific environmental issues are managed in accordance with the appropriate management plan are provided further in this section. WCPL's approved management plans and monitoring programmes include, but not limited to:

- Environmental Management Strategy (EMS001);
- Environmental Monitoring Program (EMP003);
- Biodiversity Management Plan (EMP010);
- Air Quality and Greenhouse Gas Management Plan (EMP008);
- Noise Monitoring Program (EMP011);
- Blast Monitoring Program (EMP007);
- Water Management Plan incorporating the following:
 - North Wambo Creek Diversion Plan;
 - Groundwater Monitoring Program (EMP016);
 - Surface Water Monitoring Program (EMP015);
 - Erosion and Sediment Control Plan (EMP012); and
 - Surface and Groundwater Response Plan (EMP017)
- SBU Extraction Plan Longwalls 11 to 16;
- Bushfire Management Plan (EMP005);

¹³ Condition 1, Schedule 6 of DA305-7-2003.

- Heritage Management Plan (EMP510); and
- Wambo Homestead Complex Mine Management Plan (EMP002).

As required by DA305-7-2003, the EMS and all associated management plans will be reviewed for adequacy during the MOP term.

In addition, an EP will be prepared and approved prior to the commencement of any secondary extraction at SBUE. This will occur during this MOP term.

WCPL maintains an extensive environmental monitoring program whereby data is collected, analysed and maintained to establish baseline data, reporting, future examination and assessment.

On behalf of WCPL, Peabody maintains a website for all stakeholders to access recent environmental assessments, environmental management plans, environmental monitoring reports and community information using the following link: <https://www.peabodyenergy.com/Operations/Australia-Mining/New-South-Wales-Mining/Wambo-Approvals,-Plans-Reports>

In accordance with Condition 10, Schedule 6 of DA305-7-2003, the results from the environmental monitoring program are provided on the website. In accordance with Condition 5, Schedule 6 of DA305-7-2003 annual reporting from the environmental monitoring program is also provided within the Annual Review and accessible on the website.

The Mine maintains a 24 hours a day, 7 days per week community complaints line which is directed to the Environment and Community Manager (phone: **02 6570 2245**). Community complaints can also be directed to the community email: wambocommunity@peabodyenergy.com.

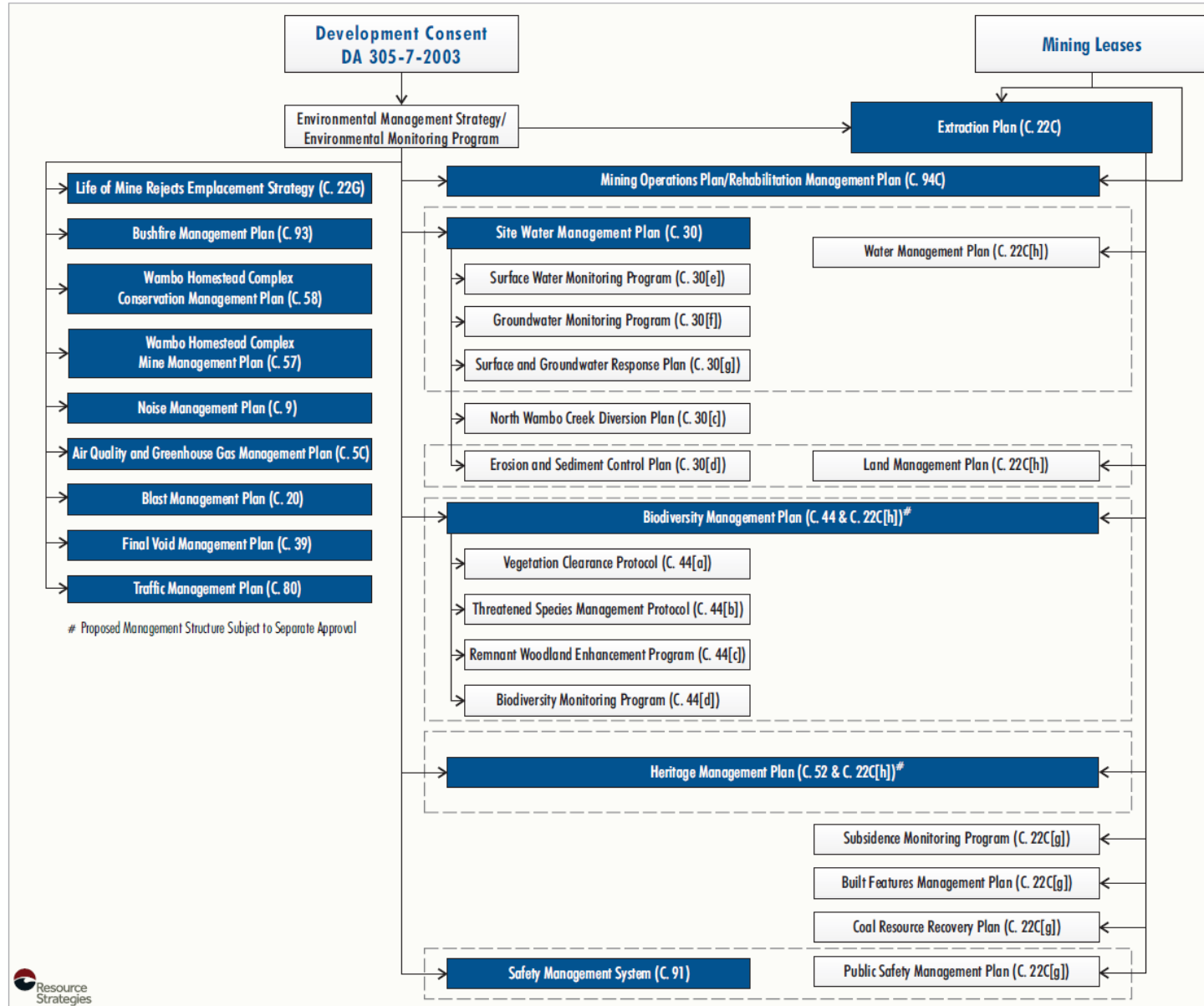
3.2.1 Pollution Incident Response Management Plan

A Pollution Incident Response Management Plan (PIRMP) has been prepared by WCPL, as holder of Environment Protection Licence No.529 (EPL 529) in accordance with Part 5.7A of the *Protection of the Environment Operations Act 1997* (POEO Act) and Part 3A of the *Protection of the Environment Operations (General) Regulation 2009* (POEO Regulation).

The PIRMP has been implemented by WCPL, including all of its employees and contractors, in the event of a pollution incident at WCPL. In particular the PIRMP provides information regarding procedures for:

- The identification of a pollution incident;
- Notification of pollution incidents in certain circumstances; and
- Responses to pollution incidents by WCPL including all of its employees and contractors.

Figure 5 Wambo Coal Mine Environmental Management System



3.3 Specific Risk Relating to Rehabilitation

3.3.1 Geology and Geochemistry

WCPL is situated within the Hunter Coalfield, a subdivision of the Sydney Basin, which forms the southern part of the Sydney-Gunnedah-Bowen Basin. The coal bearing rocks of the Sydney Basin are Permian in age (i.e. approximately 225 to 270 million years old) and are typically associated with low-lying gentle topography. The overlying rocks of Triassic age (i.e. approximately 180 to 225 million years old) cover large parts of the Sydney Basin and tend to form prominent escarpments where they outcrop.

The Whittingham Coal Measures are divided into the Jerrys Plains Subgroup, Vane Subgroup, Denman Formation and Archerfield Sandstone. The upper part of the Whittingham Coal Measures, the Jerrys Plains Subgroup, contains some 15 formally named coal seams (**Figure 3**). Seam structure is relatively simple with the seams dipping gently to the southwest at approximately 2-3 degrees. Minor local variations do occur around fault zones that are well known, having been mapped in previous open cut and underground operations. Previous longwalls and pillar extraction workings exist within the Whybrow Seam above the NWU mine.

The Open Cut operations extract coal from Whybrow¹⁴, Redbank Creek¹⁵, Wambo¹⁶ and Whynot¹⁷ Seams (**Figure 3**). The SBU mine extracted the Whybrow Seam and is currently extracting in the Wambo Seam. The SBUE mine will extract the Whybrow Seam.

The waste rock materials generated by the WCPL are typically alkaline and slightly sodic which are common geochemical characteristics of coal mine waste rock material in the Hunter Valley (Project EIS). If inappropriately managed, the sodicity of the WCPL soils and waste rock materials has the potential to impede revegetation success due to typical sodicity-related problems such as poor soil structure, surface crusting, low infiltration and increased erosion potential.

Section 2.3.4 and **2.3.5** of describes the management strategies for waste rock and tailings emplacement respectively. **Section 3.4.1** describes the general process for characterisation of the waste rock material to determine the appropriate application of ameliorants where necessary. These ameliorative measures include the use of lime, gypsum and/or fertiliser to improve the chemical and/or nutrient properties of the soil. Further management measures are provided in **Section 6.0** of this MOP. WCPL will continue to use these types of soil management strategies where appropriate to optimise the potential for achieving rehabilitation objectives and maintaining a stable, sustaining vegetation cover.

¹⁴ The Whybrow Seam is part of the Mount Leonard Formation (the uppermost unit of the Jerrys Plains Subgroup) and consists of piles A, B and C.

¹⁵ The Redbank Creek Seam is part of the Malabr Formation (the uppermost unit of the Jerrys Plains Subgroup) sequence consists of four plies A, B, C and D.

¹⁶ The Wambo Seam is part of the Malabr Formation (the uppermost unit of the Jerrys Plains Subgroup) and is mined as a single seam.

¹⁷ The Whynot Seam is part of the Malabr Formation (the uppermost unit of the Jerrys Plains Subgroup) and is mined as a single seam.

3.3.2 Material Prone to Spontaneous Combustion

Spontaneous combustion is oxidation at exposed coal surfaces which occurs at or near ambient temperature producing heat energy. No major incidents of spontaneous combustion within rehabilitation areas have been reported at WCPL during the past 30 years of operation, even though laboratory testing results indicate a moderated to high propensity for spontaneous combustion. Minor spontaneous combustion events at WCPL have historically been rare and associated with heating events in long term coal stockpiles.

Therefore the risk to rehabilitation, as a direct result of possibly spontaneous combustion events, is considered low at WCPL. However, routine inspections for indicators of spontaneous combustion in the Open Cut will continue to be conducted by Production Supervisors and Open Cut Examiners (OCE) during the MOP term. Inspections for indicators of spontaneous combustion will also be carried out during each monthly environmental inspection undertaken by WCPL Environmental Department.

With respect to rehabilitation, material that has the potential to have spontaneous combustion risks will not be used in rehabilitation works. This material, if identified, will be covered to a depth of at least 5m below the final landform RL using inert waste rock material.

Likewise, reject emplacements integrated into the landform being reshaped will be covered to a depth of at least 2m below the final landform RL using inert waste rock material.

3.3.3 Material Prone to Acid Mine Drainage

Waste rock samples were taken from exploration drill holes within the Project open cut area and were assessed for acid mine drainage (AMD) potential and element leaching (2003 EIS). Results of the testwork undertaken classified the waste rock samples as non-acid forming (NAF) and unlikely to generate environmentally harmful leachate when exposed to surface oxidation processes. These results are consistent with the observed behaviour of waste rock at the Mine i.e. acidity has not historically been a problem with the Mine waste rock material. The pH of the tested overburden material and interburden materials range from pH 6.8 to pH 9.6, which is typical of unweathered rocks in the Singleton Coal Measures (EIS 2003). Therefore the risk to rehabilitation, as a direct result of possibly AMD events, is considered low at the Mine.

Coal reject samples (coarse reject and tailings) taken from the CHPP were classified as indeterminate (IND) and potentially acid forming (PAF), respectively. However, AMD has not been identified at the Mine and is not expected to occur during the life of the Mine provided appropriate CHPP reject management practices are implemented, whereby tailings are incorporated and encapsulated and/or capped with bulk non-acid forming (NAF) waste rock (**Section 2.3.5**).

Characterisation of soil and waste rock material during the mine planning phase will be undertaken. With respect to rehabilitation, overburden material exhibiting hostile characteristics (acidity, excessive alkalinity, sodicity, etc.) will be identified and isolated from vegetation root zones and areas of potentially high surface runoff (i.e. will not be used in the final 2m of material in the final landform).

WCPL routinely monitors surface water quality, groundwater quality and rehabilitation aspects as required by SWMP and GWMP to monitor the water levels, electrical conductivity (EC) and pH in site water storages. Historical surface water monitoring of sediment dams around the CHPP, coal stockpile areas and other mine water dams typically return a pH range between pH 8 and pH 9.

3.3.4 Mine Subsidence

The overriding objective for subsidence management is to minimise the potential for, or extent of, the predicted subsidence impacts. The key issues relating to subsidence impacts on rehabilitation, surface water and groundwater resources, land resources and agricultural activities, biodiversity, built features, heritage sites and values and public safety are described in detail in the relevant Extraction Plan (EP). The EP also details relevant monitoring and management measures that will be undertaken relevant to each identified impact.

As required by the EP, remediation will be conducted of subsidence impacts or environmental consequences detected by subsidence monitoring, where required in consideration of the potential impacts of the unmitigated impact (including potential risks to safety and the potential for self-healing or long-term degradation) and the potential impacts of the remediation.

A number of potential management measures are available to mitigate/remediate subsidence impacts on land in general resulting from underground mining operations. The requirement and methodology for any subsidence remediation techniques will be determined in consideration of:

- Potential impacts of the unmitigated impact, including potential risks to public safety and the potential for self-healing or long-term degradation; and
- Potential impacts of the remediation technique, including site accessibility.

Minor cracks that develop are not expected to require remediation as geomorphologic processes will result in natural filling of these cracks over time.

Remediation of typical surface cracks (generally in the order of 25mm to 50mm, but up to approximately 150mm) will use conventional earthmoving equipment (e.g. a backhoe) and will include:

- Infilling of surface cracks with soil or other suitable materials; or
- Locally re-grading and re-compacting the surface.

Areas of surface cracking will be stabilised using erosion protection measures (e.g. vegetation seeding and planting and/or brush matting). Drainage works and rehabilitation of subsidence troughs (i.e. areas of induced ponding) will be conducted as necessary, and may include stabilisation of banks subject to soil slumping.

If surface crack remediation works are required in remnant vegetation areas, compact mobile equipment will be utilised, where practicable, to minimise damage to surrounding vegetation. If the remediation work requires clearing of remnant vegetation to an extent that would exceed the benefit of the remediation, the requirement for remediation will be reviewed. Vegetation that requires clearance will be subject to the VCP.

Contingency plans will be implemented where a potential exceedance of a subsidence impact performance measure or an unexpected impact is detected including consideration of identified potential contingency measures.

In accordance with the relevant EP, if subsidence impacts from either the SBU mine or SBUE mine result in greater than predicted impacts, exceedance of the performance criteria or requires greater than expected remediation activities as described in relevant EP, WCPL will notify and consult with the DRG.

If required, a revision of this this MOP will be undertaken to ensure rehabilitation activities are consistent with the revised subsidence predictions and mitigation measures outlined in the EP.

3.3.4.1 Subsidence on Steeper Slopes and NWC Diversion

All longwall panels associated with the SBU mine and SBUE mine are offset a minimum of 26.5° from the base of the Wollemi National Park escarpment. Subsidence monitoring to date of the SBU Mine has determined no significant deviations from subsidence modelling predictions.

Potential impacts and the relevant mitigation and management measures on steep slopes in the Wollemi National Park escarpment resulting from the proposed extraction of longwalls, associated with the SBU mine, is provided in *Extraction Plan - South Bates (Whybrow Seam) Underground Mine Longwalls 11 to 16*.

The remediation measures and implementation of additional measures if required, regarding subsidence impacts on sections of the North Wambo Creek Diversion, are outlined in the approved *Extraction Plan - South Bates Underground Mine Longwalls 11 to 16*. All subsidence remediation measures to be undertaken by WCPL, in regards to the North Wambo Creek Diversion will be in consultation with the DRG.

3.3.4.2 Historical Subsidence

As described in **Section 2.3.2**, WCPL has commenced subsidence repairs to an adjacent landholder's property in 2015 (**Plan 2**). The subsidence was a result of underground mining activities associated with the former Homestead underground workings. The nature of the works primarily involves filling in pot holes and surface cracks, soil amelioration and reseeding with pasture species of these areas.

More recent subsidence events have been associated with the NWU mine on WCPL owned land. Subsidence monitoring has identified surface cracking in the predicted range of 20mm to 100mm wide, however surface cracking within the predicted range 150mm to 200mm has been identified on LW8a. In general, as the depth of cover decreases to the north, subsidence cracking widths tend to increase.

Remedial actions to date of subsidence impacts from the NWU mine have included repairs to internal roads i.e. filling in cracks to reduce safety risks. WCPL will also be recommissioning South Dam in consultation with the DSC (before water is returned to the dam) during the MOP term.

WCPL are developing a subsidence remediation program to address a number of subsidence impacts (mainly surface cracking) within areas of existing pasture (Domain C) utilised for grazing and previously rehabilitated areas in the open cut (Domain 6). The results of the subsidence remediation activities will be provided in the Annual Review.

3.3.4.3 Subsidence Management and Extraction Plans

A subsidence impact assessment was undertaken by G.E. Holt and Associates (2003) for the Project EIS. Following the modification of Development Consent (DA 305-7-2003), G.E. Holt and Associates re-assessed the potential subsidence impacts of the re-orientation of the longwall panels in the NWU mine as part of the Wambo Development Project Wambo Seam Underground Mine Modification (2005 SEE). Further subsidence impact assessments have been completed including:

- Ditton Geotechnical Services (2012) NWU Mine Subsidence Assessment for LW 7 and 8;
- MSEC (January 2014) NWU Mine Subsidence Assessment for LW7 to 10;
- MSEC (August 2014) NWU Mine Subsidence Assessment for LW10a;
- MSEC (July 2015) SBU MOD15 and EP LW11 to LW13; and
- MSEC (December 2016) Extraction Plan for WYLLW11 to WYLLW13 in the Whybrow Seam and WMLW14 to WMLW16 in the Wambo Seam.
- MSEC (January 2017) South Bates Extension Modification Subsidence Assessment.

The various EP approvals are summarised below, and include:

- **NWU SMP LW1 to 6**

The NWU previously operated under an approved Subsidence Management Plan (SMP) for LW1 - 6. The SMP for First Workings was approved in October 2005 with mining commencing in November 2005. The SMP for Second Workings was lodged in March 2006 and was approved on the 11 December 2006. This SMP covered underground mining activities until 1/11/2013 which includes longwall panels 1 through to 6 (LW 1- 6).

- **NWU EP LW7 to LW10a**

The approved NWU EP for LW7 to LW10 was revised to include the approved LW10a. The revised EP for LW7 to LW10a was approved on the 24 June 2015;

- **SBU – EP LW11 to 13**

The EP for LW11 to LW13 for the SBU mine in the Whybrow Seam was approved by the DP&E on the 9 February 2016; and

- **SBU – EP LW11 to 16**

The EP for South Bates SBLW13 to SBLW16 (*Extraction Plan - South Bates Underground Mine Longwalls 11 to 16*) was conditionally approved by the DP&E on the 16 May 2017. The approval considered the reduced lengths of LW13 to LW16 would result in similar or less subsidence related impacts to those approved as part of the approved layout and therefore can be generally in accordance with the Development Consent DA305-7-2003 as modified.

3.3.4.4 Subsidence Monitoring Program

Visual monitoring of remediated subsidence areas will be conducted monthly to identify any requirement for maintenance measures and/or remedial works (**Section 8.2**).

Any installed sediment control structures will be inspected on a monthly basis, or following rainfall events of equal to or greater than 20 mm/day (midnight to midnight) as recorded by the Wambo Meteorological Station. The sediment control structures will be inspected for capacity, structural integrity and effectiveness.

Details of subsidence impacts observed is GPS and photographically recorded in the Subsidence Impact Register, maintained by the WCPL's Chief Surveyor. Visual inspections will be undertaken in accordance with inspection checklists as provided in the relevant Extraction Plan.

3.3.5 Erosion & Sediment Control

An Erosion and Sediment Control Plan (ESCP) has been developed to satisfy Condition 32, Schedule 4 of the Development Consent (DA 305-7-2003) and details erosion and sediment control methods. The control measures described in the ESCP aim to:

- Minimise soil erosion and sediment generation in areas disturbed during the development; and
- Minimise the potential for mining activities to adversely affect the water quality of the Wollombi Brook or the Hunter River.

The ESCP includes:

- Identification of activities that have the potential to cause soil erosion and sediment generation;
- A description of the location and capacity of erosion and sediment control structures;
- A description of measures to minimise soil erosion and the potential for the migration of sediments to downstream waters; and

- A program to monitor the effectiveness of control measures.

The ESCP will be reviewed as required by DA305-7-2003 and in consultation with the relevant authorities and updated where necessary. The following control measures as identified in the ESCP for land disturbance, land rehabilitation, topsoil management and monitoring include:

- **Subsidence Management**

Regular monitoring for surface cracking and ponding sites are carried out in accordance with the relevant EP. Should surface cracking and/or ponding sites be identified as presenting an immediate safety, environmental hazard (e.g. an erosion hazard) or risk to final land use, the area will be repaired and rehabilitated as identified in **Section 3.3.4**. As required by the ESCP, appropriate sediment controls must be in place during these repair works until the area is considered suitably stable.

- **Land Disturbance**

Land disturbance will be minimised and limited to those areas outlined in this MOP. Prior to any disturbance of land, an SPD must be completed by the operational manager (or delegate), in consultation with the Environmental Department. The SPD process identifies potential erosion and sediment risks associated with proposed disturbance projects, and requires appropriate erosion and sediment control measures to be implemented prior to disturbance commencing.

- **Land Rehabilitation**

Progressive rehabilitation is a key element for erosion and sediment control. Mining disturbed land (with altered topography, surface conditions and increased catchment sizes) represents a high potential for erosion and sediment impacts. The potential for erosion and sedimentation impacts decreases substantially as disturbed land is reshaped and revegetated as part of the land rehabilitation process. In order to minimise erosion and sedimentation impacts until the rehabilitated area is suitably stable, sediment control structures (such as contour drains, drop structures and sediment control ponds) will be designed and constructed. For further details refer to the ESCP.

- **Topsoil Management**

Topsoil will be stripped and handled in accordance with the requirements under the SDP. Erosion and sediment control measures, as identified in the completed SDP, will be implemented prior to topsoil removal. Once topsoil is stripped, it will either be placed directly onto shaped overburden (where possible) and seeded or will be stockpiled for later use. If stockpiling is required, stockpiles will be managed as outlined in **Section 3.3.6** and **Table 15**.

- **Inspections and Monitoring**

Sediment control structures and tailings dams will be inspected on a frequency as specified in the ESCP. The sediment control structures and tailings dams will be inspected for capacity and visual integrity by the Environmental Department (or delegate).

3.3.6 Soil Types & Suitability

Soil landscapes of the Project were classified and mapped in accordance with descriptions in the Soil Landscapes of the Singleton 1:250,000 Sheet (Kovac and Lawrie, 1991) and the Project EIS. Major soil types identified include alluvial soils along major drainage lines, siliceous sands to the east of Wollombi Brook, yellow podzolics and yellow solodic intergrades adjacent to the alluvials on lower slopes and undulating plains, soloths on moderately elevated slopes and lithosols along the eastern boundary of the Wollemi National Park.

Due to the known variability and distribution of the soils at the Mine, the concept of soil complex units is used to identify the soil types, and provide guidance on appropriate stripping depth. The different soil complex units found at Wambo, as identified in the EIS (WCPL, 2003), include:

- Red Podzolic – found on the ridges and middle to upper slope position of the site. The upper 0.10 m of the profile of each soil type is suitable for use as topsoil.
- Yellow Podzolic / Solodic – found on the mid to lower slopes of the hills within the site. The upper 0.20 m of the profile of each soil type is suitable for topsoil.
- Lithosols – Stony or gravely soils generally occurring on upper slope and hill top areas. No depth of the profile is suitable for topsoil.
- Alluvials – found around North Wambo Creek. Suitability for topsoil recovery highly variable from 0.30 m, to limited areas of 1.0 m.

A rural land capability assessment was conducted in accordance with the standard NSW eight class system (Cunningham *et al.*, undated) which assesses biophysical soil properties and categorises land according to limitations such as erosion hazard, climate and slope. Seven of the eight classes were identified in the vicinity of the WCPL. **Table 14** lists the pre mining land classification within the proposed disturbance area of the open cut.

Table 14 Pre-Mining Land Classification for the Disturbed Area

Land Capability Classes	Definition	Areas (ha)
Class IV	<i>Land not capable of being regularly cultivated but suitable for grazing with occasional cultivation with soil conservation practices such as pasture improvement, stock control, application of fertiliser and minimal cultivation for the establishment or re-establishment of permanent pasture.</i>	428
Class V	<i>Land not capable of being regularly cultivated but suitable for grazing with occasional cultivation and structural soil conservation works such as absorption banks, diversion banks and contour ripping, together with the practices in Class IV</i>	733
Class VI	<i>Land not capable of being regularly cultivated but suitable for grazing with soil conservation practices such as limitation of stock, broadcasting of seed and fertiliser, prevention of fire and destruction of vermin.</i>	84
Class VII	<i>Land best protected by green timber</i>	14
	TOTAL	1259

Table 15 provides a summary of the soil resource strategies undertaken by the Mine. In areas of significant earthworks, topsoil and subsoil resources will be identified, stripped and, wherever practicable, spread directly onto areas prepared for rehabilitation to make use of the potential seed bank.

Table 15 Soil Resource Management Strategies

Prior to Soil Stripping	During Soil Stripping and Stockpiling	Stockpiled Soil Awaiting use in Rehabilitation Works
<ul style="list-style-type: none"> • Quantification of soil resources. • Characterisation of the suitability of soil resources for rehabilitation works. • Topsoil will be stripped prior to any land disturbance. • Recommended stripping depths¹ as provided by the soil survey in the WCPL EIS: <ul style="list-style-type: none"> - Red Podzolic (100mm) - Yellow Podzolic (200mm) - Alluvial (300mm) • Topsoil will be placed directly onto reshaped areas where possible. <p>Note:¹ Subject to quantification of soils</p>	<ul style="list-style-type: none"> • Minimisation of vegetation clearance. • Mulching of vegetation prior to topsoil stripping, where possible, to provide additional organic matter. • Selective stockpiling of soil according to soil type and chemical characteristics. • Stockpiling of soils in a manner that does not compromise the long-term viability of the soil resource. • Maximum height for stockpiles will be 3 m. 	<ul style="list-style-type: none"> • Implementation of measures to ensure long-term viability of soil resources and manage soil salinity, including: <ul style="list-style-type: none"> - Soil stockpiles to be located outside of active mining areas; - Stockpiles to be constructed with a rough surface to reduce erosion hazard, improve drainage and promote vegetation; - Stockpiles which are to be inactive for extended periods to be fertilised and seeded with cover crop and/or preferred native pasture species (Table 17) mix to maintain soil structure, organic matter, and microbial activity; - Silt fencing to be installed around soil stockpiles to control potential loss of soil where necessary; and - Soil stockpiles to be deep ripped to establish aerobic conditions, prior to re-application for rehabilitation. - Annual (or as required) weed control and maintenance program of topsoil stockpiles. - Sign posted to clearly identify topsoil stockpile areas.

Prior to soil stripping, soil resources will be quantified. Where a deficit of topsoil is identified, investigations will be undertaken to determine the viability of the use of subsoils and to identify the need for treatment measures (e.g. use of fertilisers) applied where there is a deficit of topsoil. Where direct spreading is not practicable, the stripped soil will be stockpiled and seeded with grasses, as outlined below to maintain soil viability prior to being re-spread.

Spoil areas reshaped following mining to construct a post mining landform will contain appropriate drainage works prior to the topsoil application. The area will then be ripped and seeded using direct seeding techniques. Waste rock/soil characterisation will assist in determining appropriate ameliorates in rehabilitation where necessary (e.g. the use of lime, gypsum and/or fertiliser to improve the chemical and/or nutrient properties of the soil).

Topsoil Stripping and Handling

During topsoil stripping operations, direct placement of excavated topsoil onto re-shaped areas is preferred to stockpiling, to avoid rehandling and reduce the potential for topsoil degradation or loss. If a re-shaped surface is not available, the topsoil will be stockpiled.

The following management measures shall be observed during topsoil stripping and handling:

- Stripping depths and limits (including areas of no recovery), as pegged or taped, are to be adhered to during stripping operations;
- Topsoil stripping must be adequately supervised by a member of the Environmental Department (or delegate), with operations being checked to ensure continued suitability of stripping methods and topsoil management;
- Topsoil stripping should be limited to daylight hours where possible;
- Stripping operators shall be experienced in topsoil work, or otherwise be closely supervised, to ensure topsoil stripping depths are adhered to;
- Care is to be taken during topsoil stripping to avoid structural degradation of soils – taking particular care to avoid excessive compaction (i.e. avoiding re-handling and limit stripping activities in wet conditions);
- Potential generation of dust will be considered in planning of topsoil stripping, with weather conditions, water truck availability, potential downtime and alternate standby tasks being key planning considerations;
- Preferably, soils should be stripped in a slightly moist condition and should not be stripped in either a dry or wet condition, thus reducing deterioration in topsoil quality and dust generation;
- Grading or pushing topsoil into windrows with graders or dozers for later collection for loading into rear dump trucks by front-end loaders, is the preferred soil stripping method, as it minimises compression effects of the heavy equipment generally used transport of soil material; and
- Work must be stopped if any aboriginal heritage artefacts, or other items of archaeological interest are uncovered during stripping activities. Any such items will be inspected and cleared by a member of the Environment & Community Department before stripping activities continue.

Topsoil Stockpile Management

Where direct placement of topsoil is not possible, the period of stockpiling should be minimised to reduce the detrimental effects of storage on topsoil quality, especially topsoil structure, aeration and permeability, native seed bank viability, and biological activity levels in material stockpiled greater than one metre deep. Where topsoil is likely to exceed three months, the following measures should be followed.

Location of Topsoil Stockpiles

- Topsoil stockpiles should not be located in the path of planned, or potential, projects or operations. A long-term perspective should be adopted during this planning (preferably life-of-mine) and organisation-wide consultation should be undertaken during this process. Rehandling of topsoil is expensive and detrimental to topsoil quality.

- The planned final rehabilitation location for the topsoil should be considered when locating the stockpile (i.e. where it is to be used for rehabilitation). Haulage requirements (distance and volume) to get it to the stockpile location and how it will be recovered from that stockpiled location and transported to that final destination should also be considered.
- Stockpiles should:
 - Not be placed on excessively steep landform, that will increase erosion and potentially hamper recovery;
 - Not be placed adjacent to, or amongst, existing woodland vegetation, that will potentially cause topsoil loss or damage to remnant vegetation;
 - Be located away edges of dumps, ramps, dams, drains and pits, where future recovery may be constrained, increasing cost or planning complexity;
 - Be shaped to reduce their susceptibility to wind erosion, especially if placed on top of overburden dumps;
 - Not be located in, across or adjacent to watercourses or drainage lines with potential to flow; and
 - Not be located on flat and/or low-lying areas susceptible to flooding.

Stockpile Construction

- If soil is to be stored in stockpile for more than three months, the proposed stockpile pad should be cleared of large surface rocks, vegetation and isolated from local drainage;
- Materials of different quality, source location or vegetation type should not be stockpiled together (i.e. subsoil with topsoil, exotic pasture with native woodland), and should be clearly distinguished if co-located in same vicinity;
- Preferably, topsoil stockpiles shall be no greater than three metres in height;
- Topsoil will be block tipped. Under no circumstances will topsoil be tipped over a tip head or a second lift of block tip be used;
- Stockpiles should be trimmed and graded to ensure they shed water, to avoid pooling or waterlogging;
- Stockpile surfaces should be left coarsely textured to minimise erosion until vegetation is established, and avoid surface compaction and surface sealing;
- The working face of the stockpile should be battered down to approximately 30°;
- Every effort will be made to avoid equipment trafficking over topsoil. Stockpiles should be isolated from adjacent operations and accidental vehicle access (by berm, ditch, substantial fence, bollards, old electricity poles, etc.), and clearly identified by a sign to reduce the likelihood of interference;
- Following construction, stockpiles will be surveyed and recorded on mine plans. This information will be recorded on the topsoil stockpile register, along with other relevant data pertaining to each stockpile.

Guidance on Temporary Rehabilitation

- If long-term stockpiling is planned (i.e. greater than three months), stockpiles should be ripped, fertilized and sown with pasture cover (**Table 17**) to provide sufficient erosion control, weed suppression and promote biological activity in the stockpiled soil; and
- Sterile cover crop species should be selected in consideration of secondary pasture/woodland species.

Maintenance of Existing Stockpiles

- Vegetation establishment should be regularly monitored for the first three months (or until a cover crop has successfully established), with remedial works undertaken immediately, as required, until vegetation establishment;
- On an annual basis, the stockpiles will be inspected for erosion, vegetation cover health, weed infestation and other general degradation or interference;
- Maintenance and remedial works will be scheduled, as needed. Such maintenance or remedial works may include:
 - Repair of erosion (i.e. re-grading of eroded areas), diversion of drainage paths and de-silting of sediment control structures;
 - Slashing, re-seeding or supplementary planting;
 - Application of fertiliser to address nutrient deficiency;
 - Application of ameliorants;
 - Replacing signage and access barriers; and
 - Weed and pest animal control measures.
- If stockpiles are borrowed from, but not completely removed, the excavated face will need to be re-shaped to ensure water shedding and stockpile stability, and re-sewn with a protective cover crop. Those stockpiles will also need to be ear-marked for re-survey as part of the annual topsoil survey; and
- For long-term stockpiles, a weed control and maintenance fertilising is required as part of the stockpile management program.

Stockpile Management

- All records pertaining to the assessment, inspection, management and maintenance of stockpiles will be recorded on the topsoil stockpile register;
- At the beginning of each planning/reporting year, topsoil requirements should be estimated for rehabilitation programs in the upcoming year, and adequate stockpiled topsoil allocated to meet that requirement;
- Considerations for selection of appropriate material include proximity of stockpiles to rehabilitation area, age and quality of topsoil, topsoil source vegetation type compared to selected rehabilitation outcomes, and direct placement opportunities;

- If the stockpiled topsoil is old (greater than five years) an assessment of topsoil quality should be undertaken. Such an assessment should include visual inspection, soil sampling and analytical testing to determine whether the material is still usable, or whether application of supplements and/ or ameliorants may be required; and
- Sufficient evidence of a stockpile's complete loss of inherent value would need to be recorded, and approved by the Environment and Community Manager, before a stockpile was entirely written off and spoiled or abandoned.

Topsoil Placement and Treatment

- Prior to recovery and re-spreading of stockpiled topsoil, an assessment of weed infestation on stockpiles should be undertaken to determine if individual stockpiles require herbicide application and / or "scalping" of weed species prior to topsoil spreading.
- A pre-rehabilitation topsoil stockpile inspection and testing program to characterise stockpiled material, identify suitability for the proposed rehabilitation and identify any requirement for soil ameliorants.
- Topsoil should be spread to the depth nominated.
- Preferably, topsoil should be spread, treated with fertiliser and seeded in one consecutive operation, to reduce the potential for topsoil loss to wind and water erosion.
- All topsoiled areas should be contour ripped (after topsoil spreading) to create a "key" between the soil and the spoil. Ripping should be undertaken on the contour. Best results will be obtained by ripping when soil is moist and when undertaken immediately prior to sowing.
- The respread topsoil surface should be scarified prior to, or during seeding, to reduce runoff and increase infiltration. This can be undertaken by contour tilling with a fine-tynd plough or disc harrow for example.

Ameliorant Application

- If the pre-rehabilitation assessment determines the stockpiled material is sodic, gypsum should be applied at a standard rate of 5 - 10 t/ha, depending on material sodicity.
- Preferably gypsum should be mixed in with the topsoil as part of the stripping operation (ameliorants applied to topsoil surface prior to stripping), irrespective of whether the topsoil is to be placed in storage or directly applied to a rehabilitation area.
- Application of ameliorants as part of the topsoil stripping process is cost effective, and – in the case of gypsum in particular - gives the ameliorants additional time to react and modify the soil to ensure it is a stable growing medium.
- Although low pH soil has not historically been a concern, a lime requirement test should be undertaken to determine the lime application rate, if low pH material is identified during the pre-rehabilitation assessment.
- Addition of organic supplements is recommended for high and low pH, sodic (dispersive) and low fertility soils. Such supplements can also assist in returning favourable soil microorganisms to sterile long-stockpiled material.
- Organic material application will also be considered, if sub-optimal (sterile, low fertility, poorly structured) material is identified in stockpiles.

3.3.7 Biodiversity

The management of flora and fauna, including the implementation of a vegetation clearance protocol, threatened species management protocol, RWEPP and flora and fauna monitoring programme is described in the BMP.

A flora survey and assessment was conducted by Orchid Research in spring and summer 2002 for the Project EIS. Areas of remnant vegetation were systematically surveyed using quadrats and spot sampling sites to compile a comprehensive species list and to detect threatened species which may have been present. The BMP provides a summary of the 16 vegetation communities recognised in the study area.

No threatened flora species or endangered¹⁸ populations listed in the schedules of the NSW *Threatened Species Conservation Act, 1995* (TSC Act) and/or Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act) were recorded at WCPL by Orchid Research in 2003. At the time of the Project EIS, two Endangered Ecological Communities were identified, namely, the Warkworth Sands Woodland Endangered Ecological Community (listed in the TSC Act) and the White Box, Yellow Box, Blakely's Red Gum Woodland/Grassy White Box Woodlands Endangered Ecological Community (listed in both the TSC Act and EPBC Act).

Avifauna, mammals, reptiles and amphibians were surveyed in September and October 2002 as part of the Project EIS terrestrial fauna assessment. Bat fauna were surveyed separately in September 2002. A number of reference sources containing the results of regional fauna surveys and database records (e.g. NPWS Atlas of NSW Wildlife, Birds Australia, Australian Museum and Hunter Bird Observers Club) were also reviewed and, where appropriate, included in these assessments. The fauna surveys recorded a relatively large number of woodland birds and birds associated with waterbodies. Threatened fauna species recorded in the vicinity of WCPL are summarised in the FFMP and include eight birds and five mammals.

Aquatic macroinvertebrate, fish and water quality sampling was conducted for the Project EIS. North Wambo, Wambo and Stony Creeks are intermittent streams which cease to flow in extended dry periods. These creeks have been highly disturbed by historic and present day grazing activities. In some locations on Wambo and Stony Creeks, earthworks have been conducted to re-contour the stream channel and banks to remediate subsidence effects from past underground mining activities.

North Wambo and Wambo Creeks are considered to represent minimal fish habitat. Two native and one introduced fish species were recorded from North Wambo Creek, and three native and one introduced species recorded from Wambo Creek. A summary of specific flora and fauna management measures undertaken by WCPL, as outlined in the existing BMP, for the management of flora and fauna are provided below.

3.3.7.1 Vegetation Clearance Protocol

A Vegetation Clearance Protocol (VCP) has been developed to minimise impacts on both non-threatened and threatened flora and fauna (as listed under the TSC Act or the EPBC Act). The VCP is applicable across all WCPL managed land. The key components of the VCP are:

- Pre-clearance surveys;
- Fauna management strategies;

¹⁸ In 2003, the flora and fauna assessment for the expansion of Wambo mine identified the vegetation community adjacent to North Wambo Creek as *Acacia anuera*. During 2004, an inspection of the vegetation community above LW4 was undertaken by an Acacia expert who concluded that this stand was most likely *A. pendula*. WCPL have developed and implemented the *A. pendula Management Plan for LW4*.

- Seed Collection;
- Vegetation Clearance; and
- Salvage and re-use of materials.

Procedures in relation to the salvage of Aboriginal sites prior to vegetation clearance are detailed in the HMP. An updated VCP, which meets the requirements of DA305-7-2003 and DA177-8-2004, is included as Appendix J of the BMP.

3.3.7.2 Threatened Species Management Protocol (TSMP)

A Threatened Species Management Protocol (TSMP) has been developed to facilitate implementation of threatened species management strategies to minimise the potential impacts on threatened flora and fauna species. The key components of the TSMP are:

- Site observations/surveys;
- Threatened species management strategies;
- RWEPA area restrictions;
- Threat abatement;
- Capture and release;
- Relocation; and
- Provision of habitat resources.

An updated TSMP, which meets the requirements of DA305-7-2003 and DA177-8-2004, is included as Appendix K of the BMP.

3.3.7.3 Seed Collection

Seed collection will be on-going over the life of the Mine the timing of which will be determined by WCPL's Environmental Department. Seed collection will be sourced from onsite ecological communities identified across WCPL mine and Remnant Woodland Enhancement Areas. Where seed is required and not available from onsite sources in adequate volumes supplies may be supplemented from external providers.

3.3.7.4 Revegetation Strategy

The revegetation program will establish significant areas (some 1,570 ha) and a net increase in woodland vegetation over the long-term (WCPL, 2003). The objectives of the revegetation program are to increase the amount of native vegetation, particularly in those landscapes that have been extensively cleared. The rehabilitation program will aim to increase the continuity of vegetation in the region through the establishment of woodland corridors. Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park (**Figure 7**). The revegetation strategy includes the revegetation of disturbance areas with areas of woodland (corridors), areas which contain a mixture of woodland and pasture, and riparian vegetation, as described further below.

Native Woodland Corridors

The revegetation program will aim to re-establish as much of the floristic diversity as possible within the native woodland areas. Revegetation of native woodland areas will include the:

- Use of endemic plant species which are characteristic of the vegetation communities to be disturbed within the open cut operations area;
- Establishment of upper, mid and lower storey native vegetation; and
- Use of regionally significant flora species where practicable and appropriate.

A provisional list of species for use in the revegetation program for native woodland corridor areas is provided in **Table 16**. Plant species selection will be subject to prior rehabilitation experience/performance, the outcome of revegetation trials, consultation with regulatory authorities and stakeholders and availability.

Mixed Native Woodland/Pasture Areas

The areas proposed to contain a mixture of native woodland and pasture will be rehabilitated in a manner that results in strips or zones of native woodland which are connected to the native woodland corridors, as opposed to scattered patches of native woodland within the pasture areas. The strips or zones of native woodland will be revegetated in a similar manner and with similar species to that described for the native woodland corridors. The areas proposed to be revegetated with pasture will be revegetated using native grass and non-native species, and select exotic grass species suitable as an initial cover crop. A provisional list of native and non-native grasses that may be used in the revegetation of pasture areas is provided in **Table 17**. Species selection will be subject to prior rehabilitation experience/performance, the outcome of revegetation trials, consultation with regulatory authorities and stakeholders and availability.

Riparian Zone

The revegetation strategy for Wambo includes the planting of the banks of the NWCD (**Figure 2**) with such species as River Oak (*Casuarina cunninghamiana*) and Rough-barked Apple (*Angophora floribunda*) for example. A comprehensive species list is being developed by WCPL and external consultants to identify appropriate species diversity for the NWCD. A net increase in the quantity of riparian vegetation along NWCD is proposed. A selection of native and non-native grasses (such as those listed in **Table 17**) may also be used in the revegetation of the North Wambo Creek riparian zone. Other riparian zones (Stony Creek, Wollombi Brook, Wambo (South) Creek within Wambo Coal lands are also targeted for riparian revegetation and weed control throughout the life of mine.

Table 16 Provisional Species Lists for Woodland Corridors

Scientific Name	Common Name
Trees*	
<i>Allocasuarina luehmanii</i>	Bulloak
<i>Allocasuarina verticillata</i>	Drooping Sheoak
<i>Angophora floribunda</i> [^]	Rough-barked Apple
<i>Brachychiton populneum</i>	Kurrajong
<i>Casuarina glauca</i>	Swamp Oak
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dawsonii</i>	Slaty Gum
<i>Eucalyptus fibrosa</i>	Red Ironbark
<i>Eucalyptus moluccana</i>	Grey Box

Scientific Name	Common Name
<i>Eucalyptus punctata</i>	Grey Gum
<i>Eucalyptus teretitornis</i> [^]	Forest Red Gum
<i>Melaleuca decora</i>	A Honeymyrtle
<i>Notelaea microcarpa</i>	Native Olive
<i>Geijera salicifolia</i>	Brush Wilga
Shrubs*	
<i>Acacia filicifolia</i> [^]	Fern-leaf Wattle
<i>Acacia implexa</i> [^]	Hickory Wattle
<i>Acacia amblygona</i>	Fan Wattle
<i>Acacia falcate</i>	Sickle Wattle
<i>Acacia decora</i>	Western Silver Wattle
<i>Acacia decurrens</i>	Green Wattle
<i>Acacia parvifolia</i> [^]	-
<i>Grevillea montana</i>	A Grevillea
<i>Hibbertia linearis</i>	-
<i>Cassinia quinquefaria</i>	A Cough Bush
Grasses and Herbs*	
<i>Dianella revoluta</i>	Blue Flax Lily
<i>Lomandra multiflora</i>	Many-flowered Matrush
<i>Chloris ventricosa</i>	Tall Windmill Grass
<i>Laxmannia gracilis</i>	Wire Lily
<i>Gahnia aspera</i>	Rough Saw-sedge
<i>Aristida vagans</i>	Threawn Speargrass
<i>Austrodanthonia</i> sp.	A Wallaby Grass
<i>Austrostipa scabra</i> ssp. <i>falcata</i>	Speargrass
<i>Cymbopogon refractus</i>	Barbwire Grass

Note: [^] Species identified for the Montrose Tree Screening project. * Sowing rates for tree and shrub species, pasture species will be in consultation with WCPL rehabilitation specialist.

Table 17 Provisional Species Lists for Pasture

Scientific Name	Common Name
Native Species List*	
<i>Austrodanthonia</i>	Bunderra Wallaby Grass
<i>Austrodanthonia caespitosa</i>	Ringed Wallaby Grass
<i>Austrodanthonia richardsonii</i> cv. Hume	Hume Wallaby Grass
<i>Austrodanthonia richardsonii</i> cv. Taranna	Taranna Wallaby Grass
<i>Austrodanthonia setacea</i>	Smallflower Wallaby Grass
<i>Austrostipa aristiglumis</i> or <i>Austrostipa bigeniculata</i>	Plains Grass
<i>Austrostipa scabra</i>	Speargrass
<i>Austrostipa verticillata</i>	Slender Bamboo Grass
<i>Dichelachne micrantha</i>	Shorthair Plumegrass
<i>Elymus scaber</i>	Common Wheatgrass
<i>Lachnagrostis filiformis</i>	Blown Grass
<i>Aristida ramosa</i>	Wiregrass
<i>Bothriochloa macra/decipiens</i>	Redgrass/Pitted Bluegrass
<i>Chloris truncata</i>	Windmill Grass
<i>Chloris ventricosa</i>	Tall Windmill Grass
<i>Cymbopogon refractus</i>	Barbed Wire Grass
<i>Dichanthium sericeum</i>	Queensland Bluegrass

Scientific Name	Common Name	
<i>Digitaria brownii</i>	Cotton Panic Grass	
<i>Digitaria divaricatissima</i>	Umbrella Grass	
<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass	
<i>Panicum decompositum</i>	Native Millet	
<i>Panicum effusum</i>	Hairy Panic	
Cover Crop and Pasture Species List		
	Rate (kg/ha) Autumn Sowing	Rate (kg/ha) Spring Sowing
Couch (Hulled/Unhulled)	3	3
Wimmera Rye Grass	5	5
Green Panic	4	4
Perennial Rye Grass	6	6
Sub Clover	2	2
Seaton Park Clover	3	3
Vetch (Namoi Wolley Pod)	5	5
Fescue (Dovey, Demter)	5	5
Sephi Medic	2	2
Cavalier Medic	2	2
Japanese Millet		10 - 15
Kikuyu (Whittet)	2	2
Setaria (Spleda/Narok)	2	2
Lucerne	6	6
Oats	15 - 20	

Notes: *Shaded Cells:* A light cover crop at 2-5kg/ha for assisting initial soil stabilisation when direct seeding with woodland corridor species. *Sowing rates for native pasture species will be subject to availability and in consultation with WCPL rehabilitation specialist.

3.3.7.5 Revegetation Establishment & Timings

Vegetation may be established by the following methods:

- Sowing or direct seeding;
- Propagules (seeds, lignotubers, corms, bulbs, rhizomes and roots) stored in the topsoil;
- Spreading harvested plants with bradysporous seed (seed retained on the plant in persistent woody capsules) onto areas being rehabilitated;
- Planting nursery-raised seedlings (tubestock); and
- The most common method of vegetation establishment is broadcast seeding of selected pasture or tree seed mixes.

Seed sowing is usually supplemented by the concurrent application of granulated fertiliser. Sowing is undertaken shortly after topsoil spreading to avoid loss of topsoil due to wind and rain action. Tubestock is generally only used to establish vegetation where rapid growth or specific species establishment is required, such as remedial revegetation, erosion control or visual bunding.

Fertiliser application is beneficial to vegetation establishment to replenish any nutrient deficiencies. The type of fertiliser and application rate varies according to the specific site, soil type and post-mining use of the area. When applying any additional chemical or products to the soil, the effects of runoff and leaching will be considered, as rapid leaching from organic wastes are known to provide ideal conditions for algal blooms and exacerbate weed growth and infestation.

Timing for initial vegetation establishment is an important factor for successful revegetation. Where possible, sowing and planting are planned to occur as soon as possible prior to the expected onset of reliable rains or after a break of the season (i.e. Autumn and Spring).

Following the changes in topography, drainage and soil conditions that results from open cut mining, some local provenance species may not be suitable for revegetation and seed sourced from outside the immediate district may be required. The most appropriate species to use to rehabilitate the area are those most suited to the soil types, drainage status, aspect and climate of the site. The biodiversity values of the surrounding native vegetation communities are considered during rehabilitation planning.

Distribution of vegetation type and species selection will be designed to enhance these values, whilst ensuring that weed and fire hazards are not increased for surrounding local agricultural areas. In recognition of the importance of vegetation corridors to regional biodiversity, rehabilitation initiatives aim to increase the connectivity of vegetation in the region through the establishment of woodland corridors. Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park. In doing so, WCPL will in some ways, assist in addressing the issue of discontinuity in remnant vegetation across the Hunter Valley floor.

3.3.7.6 Roosting & Nesting Resources

Where practicable, habitat features (e.g. large hollows) would be salvaged during vegetation clearance activities and utilised in the rehabilitation areas, regeneration areas and RWEF areas. In addition, artificial roosting/nesting boxes for fauna, particularly threatened fauna, may be used in the rehabilitation areas, regeneration areas and RWEF to provide additional habitat resources.

3.3.7.7 Weed and Feral Animal Control

WCPL's weed management program will involve six monthly inspections of the RWEF areas and Mine Revegetation Areas. In addition to this, an annual routine weed management program will be implemented whereby herbaceous weed species are treated to prevent further spread. Treatment of all weeds will be undertaken by suitably qualified and experienced personnel.

A variety of vertebrate pest species have been identified within WCPLs RWEF and rehabilitation areas. These have primarily consisted of feral pigs, rabbits, foxes and dogs. The WCPL operated pest control program (as detailed in Section 6.1.1.3.1 of the BMP) is complemented by a year round WCPL agister-managed pest control program. The agister-managed program primarily targets feral pigs on grazing and buffer lands surrounding WCPLs open cut mine site. The agister-managed program utilises WCPL-owned night vision cameras to monitor the movement of pet species. Humane trapping and shooting practices are employed to capture and euthanize targeted feral species.

3.3.7.8 Rehabilitation Monitoring Programme

- Rehabilitation performance will be monitored to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures.
- A series of monitoring locations have been set up in the RWEF and rehabilitation areas to monitor regeneration of vegetation.
- Reference sites in the undisturbed woodland and grazing lands have also been established to develop suitable completion criteria against which rehabilitation/regeneration performance can be assessed.
- Sites will be monitored annually to record changes in vegetation progress and determine performance against reference sites and criteria (**Section 8**).
- Rehabilitated spoil areas will be monitored for spoil pH, Electrical Conductivity (EC), major cations and organic matter.

- Terrestrial fauna surveys are conducted to sample fauna species diversity and abundance in the rehabilitation areas, RWEF and regeneration areas. Systematic survey sites have been established to monitor amphibians, reptiles, birds and mammals.

3.4 Other Environmental and Rehabilitation Risks

3.4.1 Overburden Characterisations

Overburden and interburden materials would typically comprise sandstone and claystones respectively. The overburden and interburden materials are expected to be non-saline and non-acid forming.

Overburden characterisation, for example pH and EC monitoring, of the final landform prior to the application of topsoil, will assist determine appropriate ameliorates in rehabilitation where necessary (e.g. the use of lime, gypsum and/or fertiliser to improve the chemical and/or nutrient properties of the soil), prior to the application of topsoil.

As previously mentioned in **Section 3.3.1**, rehabilitated areas will be monitored for pH, electrical conductivity (EC), major cations and organic matter to understand the soil ability to support vegetation goals and post mine land use. Additional testing may be undertaken annually at the recommendation of the Mine's rehabilitation specialist for some areas. For further details regarding soil monitoring refer to **Section 8.2.2**.

The data will be used to identify potential deficiencies over time and assist with the development of maintenance programs if under-performing areas are identified during visual and other monitoring. This will also assist with determining/demonstrating whether the waste rock is suitable as a long-term substrate for sustainable rehabilitation.

3.4.2 Slopes and Slope Management

Rehabilitated slopes of the final landforms are to be constructed to no greater than 1:6 (10 degrees or 17%). Graded banks will be constructed across the slope of rehabilitated areas to collect and direct water flowing from newly rehabilitated areas into rock waterways. For more information regarding water management on rehabilitated areas refer to **Section 3.3.5**.

3.4.3 Air Quality

WCPL currently implements general dust mitigation measures (e.g. haul road watering) as part of operations to minimise potential dust emissions as described in the Air Quality and Greenhouse Gas Management Plan¹⁹ (AQGGMP) for the operations.

The AQGGMP summarises relevant air quality criteria, identifies potential sources of dust, provides the air quality monitoring station locations and presents the protocols for air quality monitoring. The AQGGMP also outlines proactive and reactive air quality management and mitigation measures and provides reporting procedures including complaints handling procedures and independent review.

¹⁹ Condition 5C, Schedule 4 of DA305-7-2003

Dust generation from mining activities has been identified as one of the main potential impacts during the term of this MOP. The Mine will continue watering of haul roads²⁰ to reduce emissions of particulate matter during the MOP term. Other best practice measures are described below:

- The results of dust suppressant trials at other Peabody-owned operations will be used to determine the need (or otherwise) for additional investigations at the Mine;
- The air quality monitoring network has been installed and will continue to be used to monitor air quality during the term of this MOP;
- A rehabilitation programme to revegetate previously disturbed areas as soon as practicable. This seeks to minimise the amount of disturbed land susceptible to dust generation potential;
- Implementation of a real-time air quality management system to assist in the pre-emptive management actions and to avoid potential non-compliances. This involves monitoring of instantaneous (i.e. 5 minute) and 24-hour average PM₁₀ concentrations and the implementation of a response protocol in the event that internal performance indicators are exceeded. The response protocol includes the modification or cessation of dust generating activities (i.e. excavation of material) as required.

3.4.4 Water Management

The site water management strategy is based on the containment and re-use of mine water as well as the control of sediment laden water that may be potentially carried with runoff from disturbed areas such as waste rock emplacement areas.

The water management system controls waters generated from development and operational areas while diverting upstream water around such areas. It includes both permanent structures that will continue to operate post-closure and temporary structures that will only be required until the completion of rehabilitation works. The water management system includes:

- Up-catchment diversion structures;
- Water storage dams;
- Sediment dams;
- Water transfer infrastructure (i.e. pumps and pipelines); and
- The North Wambo Creek Diversion.

The site water management system operates predominately as a closed self-contained system. The water balance of the system fluctuates with climatic conditions and as the extent of the mining operations evolves over time.

A section of the North Wambo Creek has been diverted to avoid the Open Cut Mine. The North Wambo Creek Diversion (NWCD) was constructed in accordance with the approved North Wambo Creek Diversion Plan (WCPL, 2013).

Water is predominantly required for operation of the CHPP, wash down of mobile plant, dust suppression on haul roads and hardstand areas and for dust emission control sprays in the ROM and product coal stockpile areas. Water is also used in underground mines to control dust emission in active mine areas. Some water is also used for watering vegetation establishment areas, fire fighting and other non-potable uses.

²⁰ *Wambo Coal Mine Pollution Reduction Program – Assessment and Best Practice Report.*

A Surface Water Monitoring Program (SWMP) has been prepared to satisfy DA 305-7-2003 to monitor the quality of water in adjacent natural waterways and mine water with the operations. The SWMP will be reviewed and updated where necessary during the MOP term.

3.4.5 Groundwater

A Groundwater Monitoring Programme²¹ (GWMP) has been prepared to satisfy DA305-7-2003, a component of the Water Management Plan (WMP). The groundwater monitoring program involves the monitoring of water levels and water quality from the water supply bores and groundwater seepage and surface water runoff which collect in pit sumps during mining operations. The groundwater monitoring program also involves the monitoring of groundwater levels in alluvium and selected bores. The GWMP will be reviewed and updated where necessary during the MOP term.

The Surface and Groundwater Response Plan (SGWRP) outlines the triggers used to determine if an investigation is required (i.e. implementation of the ground water investigation and contingency protocol) in the event of a groundwater performance criteria exceedence. The SGWRP relevant to groundwater includes:

- Groundwater investigation triggers, including a process to deal with a groundwater-related complaint;
- Groundwater impact investigation protocol; and
- Response plan, in the event that an investigation conclusively attributes the Mine to an adverse impact to an existing groundwater supply user.

3.4.6 Hazardous Materials Storage

Hydrocarbon Storages

Hydrocarbons used on-site include fuels (i.e. diesel and petrol), oils, greases, degreaser and kerosene. Hydrocarbon storage facilities are constructed and operated in accordance with *Australian Standard (AS) 1940:2004 The Storage and Handling of Flammable and Combustible Liquids* and the *NSW Work Health and Safety Regulation, 2011*.

The workshop infrastructure includes waste oil extraction equipment. An oil/water separator is located downslope of the workshop area, located at the vehicle washdown bay area. All waste hydrocarbons collected in the separators are disposed of by a licensed contractor.

Explosives Storage

Explosives required for the Mine include initiating products and detonators, ammonium nitrate fuel oil and emulsion explosives. The explosives storage and blast reload facilities are currently located in the Rug Dump. Explosives on-site are stored and used in accordance with *AS 2187.2:2006 Explosives – Storage, Transport and Use – Use of Explosives*. *AS 2187.2:2006* details the requirements for the safe storage, handling and land transport of explosives, safe storage distances from other activities and bunding requirements.

3.4.7 Greenhouse Gases

Management of greenhouse gases are described in the AQGGMP²². As provided by the National Greenhouse Accounts Factors (NGA Factors) (Commonwealth Department of Climate Change and Energy Efficiency, 2012), direct greenhouse emissions are referred to as Scope 1 emissions, and

²¹ Condition 33 of Schedule 3 of the Project Approval.

²² Condition 5C, Schedule 4 of the DA305-7-2003.

indirect emissions are referred to as Scope 2 and Scope 3 emissions. The major sources of greenhouse gas emissions at the Mine include:

- Combustion of diesel during mining operations (Scopes 1 and 3);
- Use of explosives (Scope 1);
- Fugitive emissions of methane (Scope 1);
- Use of petroleum based greases and oils (Scopes 1 and 3);
- Off-site generation of electricity that is consumed at the Mine (Scopes 2 and 3); and
- Transport of product coal and combustion of product coal by third parties (Scope 3).

Greenhouse gas emissions from the Mine would continue to be monitored and reported annually in accordance with Peabody's obligations under the Commonwealth Government National Greenhouse and Energy Reporting System. Peabody and WCPL will also comply with obligations under the Commonwealth *Clean Energy Act, 2011*.

3.4.8 Acid Mine Drainage

As described in **Section 3.3.3**, coarse reject material produced from the CHPP is expected to contain some sulphur and is likely to have some capacity for acid generation, whilst tailings from the CHPP would be expected to be potential acid forming (low capacity).

The pH of overburden material and interburden materials range from pH 6.8 to pH 9.6. This is typical of unweathered rocks in the Singleton Coal Measures (EIS 2003). There are no known Acid Mine Drainage (AMD) issues at WCPL, however the implementation of management strategies in regards to material with the capacity for acid generation are described in **Section 3.3.3**.

3.4.9 Blasting

WCPL have prepared a Blast Management Plan²³ (BMgtP) which describes the blast management and mitigation measures for the Mine. Open cut blasting is undertaken to comply with Section L5 of EPL 529 and AS 2187.2-2006. The BMgtP provides details on best practice control measures, blasting criteria, adverse meteorological conditions, fume and dust management, management of heritage sites, cumulative impacts, monitoring and reporting.

The results of the blast monitoring program are assessed against the airblast overpressure and ground vibration criteria identified in **Table 18** and reported annually in the Annual Review, EPL Annual Return and updated regularly on the Peabody website. The BMgtP will be reviewed and updated where necessary during the MOP term.

The objective of the monitoring is to obtain assurance that amenity overpressure and vibration limits are being achieved at privately-owned residences, safety of mine employees.

The approved blasting hours are between 9.00 am and 5.00 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary of the DP&E.

Condition 11 and Condition 12 of Schedule 4 of DA305-7-2003 stipulates the blast impact assessment criteria as displayed in **Table 18**.

²³ Condition 20, Schedule 4 of DA305-7-2003.

Table 18 Blasting Impact Criteria

Location	Airblast overpressure (dB(Lin Peak)) ¹	Ground vibration (mm/s) ²	Allowable exceedance
Residence on privately owned land	115	5	5% of the total number of blasts over a period of 12 months
(with the exception of property 13C)	120	10	0%

Notes: ¹ dB(Lin Peak) = decibel linear in peak. ² mm/s = millimetres per second.

WCPL operate a Blasting Hotline and an SMS message service²⁴ to enable the public to get up-to-date information on blasting operations at the Mine. The Environmental and Community Manager (or delegate) updates the Blasting Hotline 24hrs (**ph. 02 8250 5205**) prior to the schedule blast event.

Advertisement of both the Community Enquires Line and Blasting Information Line contact details are provided local newspapers.

3.4.10 Noise

WCPL have prepared a Noise Management Plan²⁵ (NMP), describing the noise monitoring programme comprising both attended and real-time monitoring. Integrated protocols for both monitoring methodologies are outlined in the NMP.

Attended monitoring will be used for demonstrating compliance with noise criteria, whilst real-time monitoring will be used as a management tool for taking pre-emptive management actions to avoid potential non-compliances. Potential sources of noise at the Mine during operations include:

- Open cut mining activities involving the operation of trucks, dozers, excavators, the drill and ancillary equipment in the open cut pits;
- Coal handling and preparation, including conveyors, crushers, loading into bins, the Coal Handling and Preparation Plant (CHPP) and other material handling infrastructure and associated mobile equipment;
- Haul trucks running from the active pits to the ROM stockpile area; and
- Loading of product coal at the rail load out bin.

The NMP contains protocols for responding to noise related complaints (**Section 3.2**) and is subject to continual review and reporting through the Annual Review process. The NMP will be reviewed and updated where necessary during the MOP term. Real-time monitors are located adjacent to the mine at points indicative of local rural residential areas.

The real-time system records 15 minute statistical noise data, continuous audio files and meteorological data. The continuous audio recording can also be downloaded, so that a listener can consider whether the noise being recorded is mine-related.

3.4.11 Visual and Lighting

The design and construction of surface infrastructure was undertaken in a manner that minimises visual contrasts where such infrastructure is potentially visible from private residences or public vantage points. Progressive revegetation onto rehabilitated landforms will further minimise the visual impact of the Mine and will be completed soon after landform shaping. Night-lighting effects will be

²⁴ WCPL provide a blast SMS notification service to members of the community who have registered for the service. The SMS message with blasting details is sent out the day before the scheduled blast event.

²⁵ Condition 9, Schedule 4 of DA305-7-2003.

minimised through the implementation of management measures and control structures designed to minimise light spillage.

3.4.12 Aboriginal and European Heritage

A complex-wide Heritage Management Plan (HMP) outlines the management of potential environmental consequences of the proposed secondary workings described in the Extraction Plans on heritage sites or values. The HMP has been prepared in accordance with Condition 22C(h) of Schedule 4 of the Development Consent (DA 305-7-2003). The HMP describes the management and mitigation measures for both the Wambo Homestead Complex and Aboriginal Heritage sites.

The *NSW National Parks and Wildlife Act, 1974* (NPW Act) provides the primary basis for the legal protection and management of Aboriginal heritage in NSW. Implementation of the Aboriginal heritage provisions of the NPW Act is the responsibility of the NSW Office of Environment and Heritage (OEH).

The aim of the NPW Act is to prevent unnecessary or unwarranted destruction of Aboriginal objects and to protect and conserve objects where such action is considered warranted. Under section 86(4) of the NPW Act it is an offence for a person to harm or desecrate an Aboriginal place. Consents regarding impacts to Aboriginal objects are authorised by OEH under section 90 of the NPW Act and clauses 80D and 80E of the *National Parks and Wildlife Regulation, 2009*.

AHIP #2222 was issued to WCPL on the 20 June 2005 under sections 87 and 90 of the NPW Act. The AHIP allowed for the disturbance and/or salvage of all known and unknown Aboriginal objects. AHIP #2222 is scheduled to expire on 1 March 2025. AHIP #C0001474 was approved for the development of the South Bates Underground Mine on 19 November 2015 and is valid until 2025. On 16 January 2017, an additional AHIP #C0002000 was issued by the OEH to WCPL for the development of the South Wambo Underground Mine Modification, and is valid until 16 June 2033. WCPL obtained a Care and Control Permit (#3130) for the temporary storage of salvaged artefacts until they can be replaced on the post mining rehabilitated landscape.

3.4.13 Bushfire

A Bushfire Management Plan (BFMP) has been prepared to satisfy the requirements of DA 305-7-2003. The BFMP has been prepared to the satisfaction of the SSC and the NSW Rural Fire Service (RFS). The BFMP identifies bushfire management issues relevant to the local environment, analyses bushfire risk, discusses objectives and activities and outlines standard procedures to be followed in the event of a bushfire. The BFMP is revised as necessary to include activities such as the development of fire breaks in strategic locations around the Mine. Any revision of the BFMP is undertaken in consultation with SSC and the RFS.

3.4.14 Exploration

As previously discussed in **Section 2.3.1**, the exploration drilling program will continue during the MOP term to update gas and coal quality data for WCPL. In general, all land preparation required will be in accordance with the relevant SDP. Mitigation measures relevant to exploration and land clearing activities at WCPL include the following:

- Drilling sites and access will be located to avoid areas of remnant vegetation, other sensitive areas and minimise the requirement for vegetation clearance.
- A vegetation clearance protocol and a SDP have been developed. The SDP requires the approval of the Environmental Manager (or delegate) prior to any land clearing activities taking place. The vegetation clearance protocol and SDP aims to minimise environmental impacts, including minimising the area required for disturbance for drill sites and access tracks, identify environmental issues such as Aboriginal and European heritage sites, identify sensitive flora and fauna communities, outline erosion and sediment control measures, provide topsoil management and limiting soil disturbance measures, avoiding threatened species, and the identification of any seed or timber resources that can be salvaged. In accordance with SDP process, follow up inspections are completed by WCPL's Environmental Department to ensure the SDP is carried out and each drill site is rehabilitated to the appropriate standard. Please refer to **Appendix 3** for a copy of a SDP.
- Additionally, an Exploration Drilling Permit (EDP) has been developed that details the requirements and controls to be in place before the commencement of exploration activities. The EDP must be completed and signed off by the relevant departmental manager for all exploration activities.

3.4.15 Construction

A number of infrastructure projects are planned within the MOP term (**Section 2.3**). The existing infrastructure is largely located within the present approved open cut disturbance area. All ROM coal handling and haulage to the CHPP will remain within the confines of the existing approved open cut mining disturbance area. Notwithstanding, some minor construction activities may be required outside of the existing open cut disturbance area within WCPL's land and will include clean water diversion drains, light vehicle access tracks and environmental monitoring sites e.g. groundwater monitoring piezometers. Mitigation measures relevant to construction activities outside approved open cut disturbance area will include the following:

- Infrastructure will be located to avoid areas of remnant vegetation, RWEPS and regeneration areas. Vegetation clearance will be kept to a minimum where practicable and in accordance with Development Consent conditions;
- Implementing vegetation clearance protocol and SDP procedure;
- Topsoil resources will be identified, stripped and stockpiled for later use in rehabilitation in accordance with **Section 3.3.6**; and
- Where vegetation clearance is undertaken, timber will be cleared, mulched, salvaged and windrowed. Windrowed timber, where practicable, will then be used in rehabilitation.

3.4.16 Public Safety

All efforts will be made to ensure the safety of the public, both as visitors to the Mine and off the Mine site. Measures to minimise risks to the public include:

- Induction programmes for employees, contractors and visitors;
- Signage and communication protocols for visitors and suppliers;
- Identification systems for visitor access to the site;
- First aid training requirements for employees and contractors;
- Maintenance of fire trails and fire management measures in accordance with the BFMP;
- Fence lines maintained in an operational condition;
- Right of way accesses to neighbours are maintained;
- Speed control signs have been installed on roads on Mine owned land; and
- Maintenance of locked gates around the site for security purposes.

Public and employee safety are fundamental considerations in the design and operation of the Mine and will be addressed through site procedures and work methods.

3.4.17 Contaminated Land

As described in the EIS (WCPL, 2003), potential land contamination risk include spills, fires or explosions associated with the transport, storage and usage of fuels, chemical and explosives. **Section 2.3.7** and **Section 3.4.6** outlines the operational procedures or mitigation measures that will be implemented to prevent or reduce the potential for land contamination.

In addition to these measures at mine closure, a land contamination assessment of areas where potential land or soil contamination (e.g. fuel and explosive storage areas), will be completed in consultation with relevant regulatory authorities. Information regarding baseline knowledge of potential land contamination areas will be incorporated into the CMCP.

Any contaminated soils identified during the assessment would be remediated on site or excavated, removed from site and disposed of at a licensed facility and the area remediated in accordance with recommendations made by the contamination assessment.

4.0 Post Mining Land Use

4.1 Regulatory Requirements

Table 19 identifies the regulatory requirements that specially affect the post mining land use, landscape and rehabilitation outcomes as identified in the Development Consent (DA305-7-2003), the Project Environmental Impact Statement (Project EIS), mining and coal lease/s.

Table 19 Rehabilitation Regulatory Requirements

Rehabilitation Regulatory Requirements	Sections in the MOP												
Rehabilitation Conditions from DA305-7-2003													
<p>Final Void Strategy</p> <p>39. At the end of Year 7 of the development, or as directed otherwise by the Secretary, the Applicant must prepare a Final Void Management Plan for the development, in consultation with the DRG, the Secretary and Council, and to the satisfaction of the Secretary. This Plan must:</p> <p>(a) investigate options for the future use of the final void;</p> <p>(b) re-assess the potential groundwater impacts of the development; and</p> <p>(c) describe what actions and measures would be implemented to:</p> <ul style="list-style-type: none"> - minimise any potential adverse impacts associated with the final void; and - manage, and monitor the potential impacts of, the final void over time. <p>The Applicant must implement the approved management plan as approved from time to time by the Secretary.</p>	Sections 5.2, 6.0 & 8.2.4												
<p>Rehabilitation</p> <p>69. Following the cessation of the use of the coal haulage road which traverses the Wambo Homestead Complex property, the land is to be returned to its former condition (pre1999) and the half palisade fence on the southern alignment of the mounting yard, which was removed, is to be reinstated as required by the approval of the Heritage Council for the construction of the road on 12 February 1999.</p>	Section 7.0												
<p>Visual Amenity</p> <p>81. The Applicant must implement measures to mitigate visual impacts including:</p> <p>(a) design and construction of development infrastructure in a manner that minimises visual contrasts; and</p> <p>(b) progressive rehabilitation of mine waste rock emplacements (particularly outer batters), including partial rehabilitation of temporarily inactive areas.</p>	Section 3.4.11												
<p>Overburden Dumps</p> <p>84. The Applicant must construct the overburden emplacements generally in accordance with the EIS, and to the satisfaction of DRG.</p>	Section 7.2.3												
<p>Rehabilitation Objectives</p> <p>94. The Applicant must rehabilitate the Wambo Mining Complex to the satisfaction of DRG. The rehabilitation must be generally in accordance with the proposed rehabilitation strategy described by the documents listed in Condition 2 of Schedule 3 and the objectives in Table 18.</p> <p>Table 18: Rehabilitation Objectives</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Area/Domain</th> <th>Rehabilitation Objectives</th> </tr> </thead> <tbody> <tr> <td>Mine site (as a whole)</td> <td> <ul style="list-style-type: none"> • Safe, stable and non-polluting; </td> </tr> <tr> <td>Surface infrastructure</td> <td> <ul style="list-style-type: none"> • To be decommissioned and removed, unless DRG agrees otherwise. </td> </tr> <tr> <td>Community</td> <td> <ul style="list-style-type: none"> • Ensure public safety; and • Minimise the adverse socio-economic effects associated with mine closure. </td> </tr> <tr> <td>Landforms</td> <td>Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.</td> </tr> <tr> <td>All watercourses subject to subsidence impacts</td> <td>Hydraulically and geomorphologically stable, with riparian vegetation established that is the same or better than prior to commencement of mining</td> </tr> </tbody> </table>	Area/Domain	Rehabilitation Objectives	Mine site (as a whole)	<ul style="list-style-type: none"> • Safe, stable and non-polluting; 	Surface infrastructure	<ul style="list-style-type: none"> • To be decommissioned and removed, unless DRG agrees otherwise. 	Community	<ul style="list-style-type: none"> • Ensure public safety; and • Minimise the adverse socio-economic effects associated with mine closure. 	Landforms	Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.	All watercourses subject to subsidence impacts	Hydraulically and geomorphologically stable, with riparian vegetation established that is the same or better than prior to commencement of mining	Section 4.3
Area/Domain	Rehabilitation Objectives												
Mine site (as a whole)	<ul style="list-style-type: none"> • Safe, stable and non-polluting; 												
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Community	<ul style="list-style-type: none"> • Ensure public safety; and • Minimise the adverse socio-economic effects associated with mine closure. 												
Landforms	Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.												
All watercourses subject to subsidence impacts	Hydraulically and geomorphologically stable, with riparian vegetation established that is the same or better than prior to commencement of mining												

Rehabilitation Regulatory Requirements	Sections in the MOP
<p>Operating Conditions</p> <p>94A. The Applicant must:</p> <p>(a) develop a detailed soil management protocol that identifies procedures for:</p> <ul style="list-style-type: none"> • comprehensive soil surveys prior to soil stripping; • assessment of top-soil and sub-soil suitability for mine rehabilitation; and • annual soil balances to manage soil handling including direct respreading and stockpiling; <p>(b) maximise the salvage of suitable top-soils and sub-soils and biodiversity habitat components such as bush rocks, tree hollows and fallen timber for rehabilitation of disturbed areas within Wambo Mining Complex and for enhancement of biodiversity offset areas;</p> <p>(c) ensure that coal reject or any potentially acid forming interburden materials must not be emplaced at elevations within the pit shell or out of pit emplacement areas where they may promote acid or sulphate species generation and migration beyond the pit shell or out of pit emplacement areas; and</p> <p>(d) ensure that no dirty water can drain from an out of pit emplacement area to any offsite watercourse or to any land beyond the lease boundary.</p>	<p>Section 3.3.6</p> <p>Section 3.3.5</p> <p>Section 3.3.6 Section 2.3.3.3</p> <p>Section 2.3.4 Section 2.3.5</p> <p>Section 3.3.4</p>
<p>Progressive Rehabilitation</p> <p>94B. The Proponent must rehabilitate the site progressively as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim rehabilitation strategies must be employed when areas prone to dust generation cannot be permanently rehabilitated.</p> <p><i>Note: It is accepted that some parts of the site that are progressively rehabilitated may be subject to further disturbance at some later stage of the project</i></p>	<p>Section 2.3.10</p>
<p>Rehabilitation Management Plan</p> <p>94C. The Proponent must prepare and implement a Rehabilitation Management Plan for the project to the satisfaction of the DRG. This plan must</p> <p>(a) be prepared in consultation with the Department, CLWD, OEH, Council and the CCC;</p> <p>(b) be submitted to the DRG by the end of June 2013;</p> <p>(c) be prepared in accordance with any relevant DRE guideline;</p> <p>(d) describe how the rehabilitation of the site would be integrated with the implementation the biodiversity offset strategy;</p> <p>(e) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and triggering remedial action (if necessary);</p> <p>(f) 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, and final land use;</p> <p>(g) include a detailed tailings management strategy that includes timing for rehabilitation of all tailings storage facilities, in order that final land form and land use objectives can be achieved in a timely manner;</p> <p>(h) include a plan that describes proposed grazing carrying capacity across the post mining landscape;</p> <p>(i) include interim rehabilitation where necessary to minimise the area exposed for dust generation;</p> <p>(j) 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</p> <p>(k) build to the maximum extent practicable on the other management plans required under this consent.</p>	<p>This MOP (see Table 4)</p>
<p>Mine Exit Strategy</p> <p>95. The Applicant must work with the Council to investigate the minimisation of adverse socio-economic effects of a significant reduction in local employment levels and closure of the Wambo Mining Complex at the end of its life.</p>	<p>Section 1.6.1</p>
Rehabilitation Conditions from Mining & Coal Leases	
<p>CL374, ML1572, ML1594</p> <p>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:-</p> <ul style="list-style-type: none"> • 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 revegetation is required and native vegetation has been removed or damaged, 	<p>Section 3.3.5 Sections 4.2 & 4.3</p> <p>Section 4.0</p>

Rehabilitation Regulatory Requirements	Sections in the MOP
<p>the original species must be re-established with close reference to the flora survey included in the Mining Operations Plan. If the original vegetation was not native, any re-established vegetation must be appropriate to the area and at an acceptable density.</p> <ul style="list-style-type: none"> The land does not pose a threat to public safety. <p>13(b). Any topsoil that is removed must be stored and maintained in a manner acceptable to the Director-General.</p> <p>CL397</p> <p>30. Subject to any specific condition of this lease providing for rehabilitation of any particular part of the subject area affected by mining or activities associated there within, the registered holder shall:</p> <p>(a) reinstate, level, regrass, reforest and contour 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</p> <p>(b) fill in, seal or fence, to the satisfaction of the Minister, any excavation within the subject area.</p> <p>CCL743, ML1402,</p> <p>7. Disturbed land must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the Director-General.</p>	<p style="text-align: center;">Section 3.3.7</p> <p style="text-align: center;">Section 3.4.17 Section 3.3.6</p> <p style="text-align: center;">This MOP</p>

4.2 Post Mining Land Use and Landscape Goals

Land use in the vicinity of the Mine is characterised by a combination of coal mining operations, agricultural land uses and the village of Warkworth. Wollemi National Park is located to the south and west of Wambo and forms part of the Greater Blue Mountains World Heritage Area (WCPL, 2003). Accordingly, the final landform proposes a balanced rehabilitation outcome which recognises the alternative land uses that exist in the region, and therefore aims to establish the potential for both sustainable agriculture and endemic woodland habitat (**Section 3.3.7**). The proposed design of final landforms and the revegetation strategy is described in **Section 5.0** and illustrated by **Figure 6** and **Plan 4 (Appendix 1)**.

The post mining land use will be considered in further detail in the revision of the CMCP. The revision of the CMCP will incorporate a review of the constraints and opportunities to identify potential sustainable land-use options, in consultation with relevant stakeholders in order to obtain feedback of any issues that need to be considered as part of the final land use analysis. The revised CMCP will be submitted to the DRG and other relevant stakeholders for comment and approval by the end of 2018 (**Section 1.6.1**).

Surface infrastructure with no ongoing beneficial use will be removed from the site at the completion of mining. Some infrastructure (e.g. site access roads, water storages) may be retained for alternate post mining uses (where agreed in consultation with relevant authorities and local landholders). The revision of the CMCP will also examine WCPL-owned lands that are not subject to mining operations or land affected by mine subsidence, which are currently used for the agistment of stock and whether the land can be transferred to local landholders or sold.

4.2.1 Integration with RWEPA Areas (Biodiversity Offsets)

In recognition of the importance of vegetation corridors to regional biodiversity, rehabilitation initiatives will aim to increase the continuity of vegetation in the region through the establishment of woodland corridors. Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park (WCPL, 2003).

Remnant Woodland Enhancement Program (RWEPP) areas have been established at WCPL to help to conserve regional biodiversity, whilst enhancing the habitat available to flora and fauna. Details of the management of the RWEPP areas are provided in the BMP. WCPL has finalised agreements to conserve the RWEPP areas A, B, C, D, D Extension and the Coal Terminal area as part of a Voluntary Conservation Agreement under Part 4, Division 12 of the NSW *National Parks and Wildlife Act, 1974* in accordance with Condition 41, Schedule 4 of Development Consent (DA 305 7 2003). WCPL is in the process of varying the Conservation Agreement to include RWEPP area E. Wherever possible, it is proposed to link existing woodland with woodland rehabilitation areas to provide corridors for the movement of fauna and to establish a net increase in woodland areas in the Hunter catchment. The revegetation strategy includes revegetation of disturbance areas with areas of woodland (corridors), areas which contain a mixture of endemic woodland and pasture, and riparian vegetation. A detailed description of the revegetation strategy is provided in **Section 3.3.7**.

The final distribution of woodland to be established on rehabilitated landforms will ultimately depend on the outcome of closure planning including the shape of final landforms and the agreed post mine land use (WCPL, 2003). The final rehabilitated landform at lease relinquishment is shown on **Plan 4**. The rehabilitation phases during this MOP term are described in **Section 5.3**.

4.3 Rehabilitation Objectives

The objectives for rehabilitation are guided by the rehabilitation objectives outlined in **Table 19** from the Development Consent (DA 305-7-2003) as shown in **Table 21**. The overall rehabilitation objectives for Wambo (as provided in Wambo Development Project Environmental Impact Statement [the EIS] [WCPL, 2003]) build on and incorporate the rehabilitation objectives outlined in the Development Consent (DA 305-7-2003) and include:

- The creation of safe, stable, adequately drained post-mining landforms that are consistent with the local surrounding landscape;
- Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park;
- Preservation of existing beneficial use of water resources; and
- Development of a sustainable post-mining land use plan towards the end of mine life.

The following key rehabilitation principles form the basis for rehabilitation planning and design at Wambo (WCPL, 2003):

- Existing remnant vegetation to be preserved wherever possible;
- Integration of open cut mining and rehabilitation planning to minimise the area of disturbance at any one time;
- Progressive rehabilitation of disturbed areas, including partial rehabilitation of temporarily inactive waste rock emplacements;
- Creation of post-mining landforms that enhance the amenity of the local landscape and contribute to local and regional habitat corridors as presented in the Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales (NSW Department of Mineral Resources, 1999);
- Consideration of issues of public safety in the design of final landforms;
- Consultation with the relevant state government authorities, SSC and the CCC during the final design and planning of rehabilitated landforms;

- Implementation of trials and design studies as necessary to maximise effectiveness of the rehabilitation program; and
- Routine monitoring in order to identify rehabilitated areas requiring maintenance works.

4.3.1 Progressive Rehabilitation of Disturbed Areas

As an integral component of staged mining operations, rehabilitation of the final mine waste rock landform (when they become available) and other areas of disturbance will be conducted progressively over the life of the mine and will be scheduled to minimise the disturbed area at any point in time. Particular focus will be placed on the outer batters of the mine waste rock emplacements. Interim rehabilitation measures, including the establishment of cover crops and dust management controls on incomplete landforms and other inactive disturbance areas, will be implemented where they may remain inactive for an extended period. These measures will provide initial stabilisation of mine landforms, reduce the visual impact of the mine and minimise the potential for generation of windblown dust and sediment laden runoff.

5.0 Rehabilitation Planning

5.1 Domain Selection

Mine closure or rehabilitation domains for this MOP (**Plan 2**) have been identified on the basis of their operational and functional purpose within the mining disturbance boundary and presented in **Table 20** and displayed in **Figure 6**.

Primary domains can be defined as land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics. Primary domains outline current land use during the MOP period.

Secondary domains are land management units characterised by a similar post mining land use objective. Secondary domains define the final land use at mine closure.

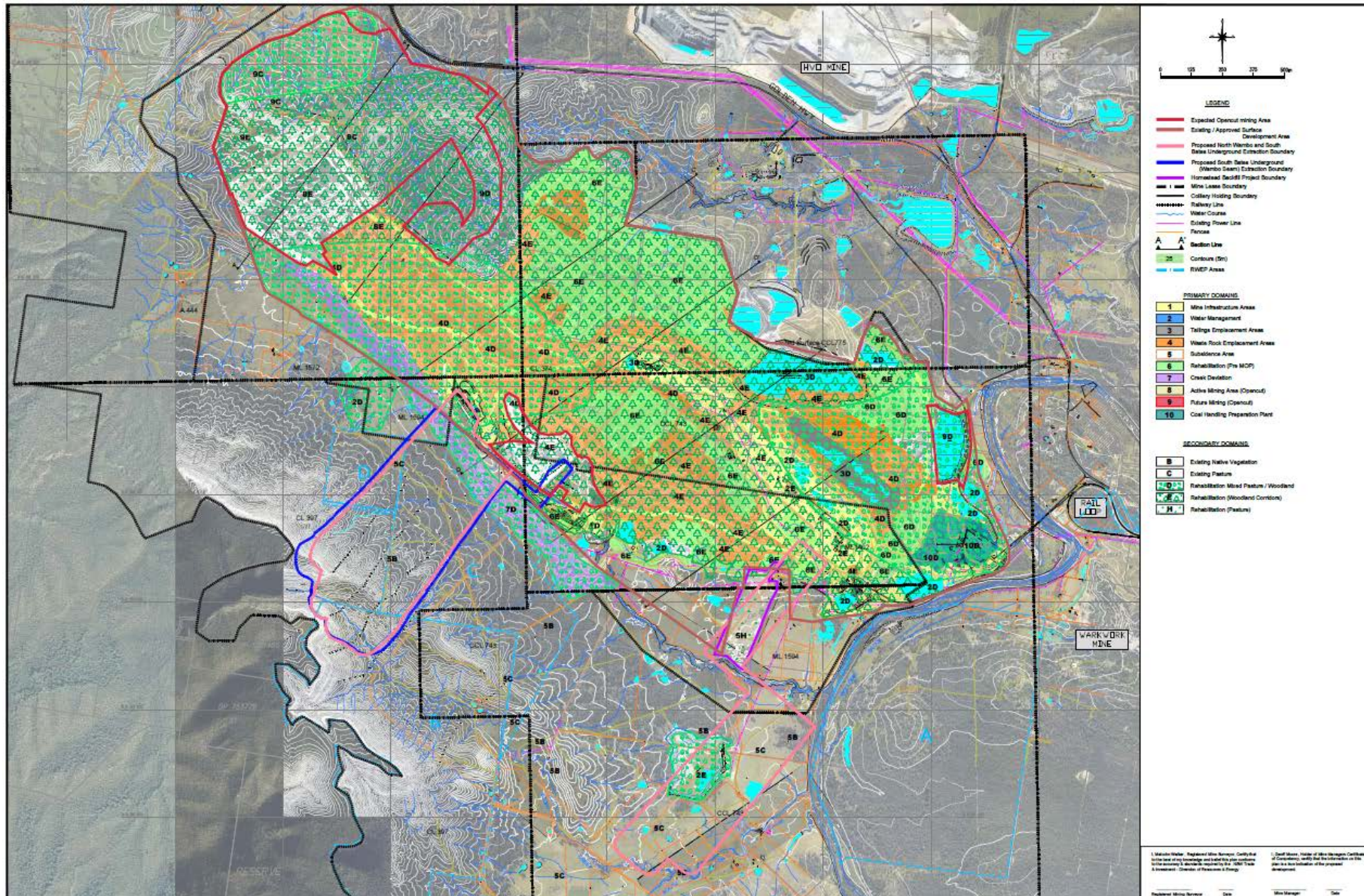
Table 20 MOP Rehabilitation Domains

Primary Domains	Code	Secondary Domains	Code
Mine Infrastructure Areas	1	Water Management	A
Water Management	2	Existing Native Vegetation	B
Tailings Emplacement Areas	3	Existing Pasture	C
Waste Rock Emplacement Areas	4	Rehabilitation (Mixed Pasture/Woodland)	D
Subsidence Area	5	Rehabilitation (Woodland Corridors)	E
Rehabilitation (Pre MOP)	6	Final Void	F
North Wambo Creek Diversion	7	Mine Infrastructure Areas	G
Active Mining Area	8	Rehabilitation Pasture	H
Future Mining	9		
Coal Handling Preparation Plant	10		

In summary, the following rehabilitation domains have been developed for WCPL (as shown on **Figure 6** and **Plan 2**) for the MOP term, including:

- Domain 1D – Mine Infrastructure Areas – Rehabilitation Mixed Woodland/Pasture.
- Domain 2A – Water Management Area.
- Domain 3D – Tailings Emplacement Area – Rehabilitation Mixed Pasture/Woodland.
- Domain 4D/4E – Waste Rock Emplacement Areas – Rehabilitation Mixed Woodland/Pasture and Woodland Corridor.
- Domain 5B/5C – Subsidence Area – Existing Native Vegetation or Existing Pasture or Rehabilitation Pasture.
- Domain 5H – Subsidence Area – Existing Pasture.
- Domain 6C/6D – Rehabilitation Pre MOP – Existing Pasture or Rehabilitation Mixed Woodland/Pasture.
- Domain 7H – North Wambo Creek Diversion – Rehabilitation Pasture or Rehabilitation Mixed Woodland/Pasture.
- Domain 8F – Active Mining Area – Final Void.
- Domain 9D or 9E – Future Mining Area – Rehabilitation Mixed Woodland/Pasture or Woodland Corridor.
- Domain 10D, 10E, or 10G – Coal Handling Preparation Plant – Rehabilitation Mixed Woodland/Pasture or Woodland Corridor or Mine Infrastructure Area (decommissioned).

Figure 6 Mine Domains



REV.	DATE	BY	DESCRIPTION	CHK.	REV.	DATE	BY	DESCRIPTION	CHK.
B	31/11/2015	M.W	MOP PERIOD EXTENDED TO 2020 (5 YEAR)						
E	31/12/2015	M.W	MOP AMENDMENT B						
F	31/3/2016	M.W	MOP AMENDMENT C						
G	31/10/2016	M.W	MOP AMENDMENT D						

		WAMBO COAL PTY LIMITED ABN 13 000 660 207 Jerry's Plains Rd, Warkworth Phone: 02 65 702200 Via Singleton, NSW, 2330 Fax: 02 65 702290 Prepared by NWT Survey Ph: 02 65 702318		Wambo Coal Mine Mining Operations Plan - Plan 2 (Amendment D) Mine Domains - At Commencement of MOP				Drawing No. 1995 Revision No. C Sheet Size A0	
Date	Scale	Drawn	Checked	Approved	Shed Size				
31/10/2016	1:11,000	MJW	SP	GM, MW	A0				

5.2 Domain Rehabilitation Objectives

As discussed in **Section 4.2 and Section 4.3**, the objectives of final rehabilitated landform is to establish a safe, non-polluting and stable landform that is compatible with the surrounding landscape and that meets the requirements of the post mining land use (**Section 4.2 and Figure 7**). In addition, domain rehabilitation objectives are further outlined in **Table 21**. This will incorporate selective vegetation communities determined by beneficial post closure land uses, to be defined and agreed in consultation with relevant stakeholders, the community and government.

Final rehabilitation requirements would ultimately be refined and developed in consultation with key government authorities and other relevant stakeholders and reported in consecutive Open Cut MOP's for approval prior to implementation.

Table 21 Domain Rehabilitation Objectives

Domain	Rehabilitation Objectives
Primary Domains	
Domain 1: Mine Infrastructure Areas	<ul style="list-style-type: none"> • All infrastructure removed that is not required post closure. • All hazardous materials and contaminated materials removed. • Entrances to underground mine workings sealed and made safe. • Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) • Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. • Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. • Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.
Domain 2: Water Management	<ul style="list-style-type: none"> • All hazardous materials and contaminated materials removed. • All infrastructure removed that is not required post closure. • Preservation of existing beneficial use of water resources. • Provide a self-sustaining land form post mine closure. • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. <ul style="list-style-type: none"> - Water quality non-polluting and appropriate for conservation end land use. - Water quality leaving site to be in accordance with the EPL water quality criteria.
Domain 3: Tailings Emplacement Areas	<ul style="list-style-type: none"> • All hazardous materials and contaminated materials removed. • Design of capping to prevent soil erosion and exposure to tailings material beneath. • Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) • Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. • Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. • Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.

Domain	Rehabilitation Objectives
Domain 4: Waste Rock Emplacement Areas	<ul style="list-style-type: none"> • All hazardous materials and contaminated materials removed. • Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) • Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. • Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. • Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.
Domain 5: Subsidence Area	<ul style="list-style-type: none"> • Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options. • All watercourses subject to subsidence impacts shall be hydraulically and geomorphologically stable, with riparian vegetation established that is the same or better than prior to commencement of mining.
Domain 6: Rehabilitation (Pre MOP)	<ul style="list-style-type: none"> • Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) • Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. • Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. • Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.
Domain 7: North Wambo Creek Diversion	<ul style="list-style-type: none"> • Pasture species established consistent with revegetation strategy. • Tree species established along creek line consistent with riparian zone.. • Creek diversion stable and will not present a greater safety hazard than surrounding land. • Creek diversion able to shed water safely without causing excessive erosion, jeopardising landform integrity or increasing pollution of downstream watercourses. • All watercourses subject to subsidence impacts shall be hydraulically and geomorphologically stable, with riparian vegetation established that is the same or better than prior to commencement of mining.
Domain 8: Active Mining Area	<ul style="list-style-type: none"> • Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) • Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. • Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. • Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.

Domain	Rehabilitation Objectives
Domain 9: Future Mining	<ul style="list-style-type: none"> Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.
Domain 10: Coal Handling Preparation Plant	<ul style="list-style-type: none"> All infrastructure removed that is not required post closure. All hazardous materials and contaminated materials removed. Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI) Woodland Corridor and Mixed Woodland/Pasture Areas established consistent with revegetation strategy. Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.
Secondary Domains	
Domain A: Water Management	<ul style="list-style-type: none"> Objectives as outlined for Domain 2
Domain B: Existing Native Vegetation	<ul style="list-style-type: none"> Conserve regional biodiversity, whilst enhancing the habitat available to flora and fauna. Existing remnant vegetation to be preserved wherever possible. Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options.
Domain C: Existing Pasture	<ul style="list-style-type: none"> Conserve and maintain existing pasture, wherever possible, to support sustainable land use e.g. grazing activities. Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options.
Domain D: Rehabilitation (Mixed Pasture/Woodland)	<ul style="list-style-type: none"> Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V) Mixed Woodland/Pasture Areas established consistent with revegetation strategy and analogue vegetation communities. Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.

Domain	Rehabilitation Objectives
Domain E: Rehabilitation (Woodland Corridors)	<ul style="list-style-type: none"> • Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class VI) • Woodland Corridor Areas established consistent with revegetation strategy and analogue vegetation communities • Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park; • Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. • Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.
Domain F: Final Void	<ul style="list-style-type: none"> • Objectives as outlined for Domain 2 • Note: The final land form use of the Final Void is subject to review and will be included in the CMCP.
Domain G: Mine Infrastructure Areas	<ul style="list-style-type: none"> • All infrastructure removed that is not required post closure. • All hazardous materials and contaminated materials removed. • Stable landform and non-polluting.
Domain H: Rehabilitation Pasture	<ul style="list-style-type: none"> • Land capability returned to a class similar to that existing prior to disturbance (i.e. Class III). • Pasture Areas established consistent with analogue pasture communities. • Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options.

Figure 7 Conceptual Final Landform and Revegetation



5.3 Rehabilitation Phases

The objective of the final rehabilitated landform is to establish a safe, non-polluting and stable landform that is compatible with the surrounding landscape and that meets the requirements of the post mining land use. The following key rehabilitation phases will be undertaken, including:

- **Stage 1: Decommissioning** – removal of hard stand areas, buildings, contaminated materials, hazardous materials;
- **Stage 2: Landform Establishment** – incorporates gradient, slope, aspect, drainage, substrate material characterisation and morphology;
- **Stage 3: Growth Medium Development** – incorporates physical, chemical and biological components of the growing media and ameliorants that are using to optimise the potential of the media in terms of the preferred vegetative cover;
- **Stage 4: 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;
- **Stage 5: Ecosystem and Land Use Sustainability** – incorporates components of floristic structure, rehabilitation maintenance including subsidence remediation, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape; and
- **Stage 6: Relinquished Land** - lands that have met the required mine rehabilitation and closure requirements for lease relinquishment.

The rehabilitation phases identified within Primary Domains during the MOP period are outlined in **Plans 3A to 3C** and summarised in **Table 22**.

Table 22 Rehabilitation Phases During the MOP term

Primary Domains Rehabilitation Phase	Primary Domains									
	(Domain 1) Mine Infrastructure Areas	(Domain 2) Water Management	(Domain 3) Tailings Emplacement Areas	(Domain 4) Waste Rock Emplacement	(Domain 5) Subsidence Area	(Domain 6) Rehabilitation (Pre MOP)	(Domain 7) North Wambo Creek Diversion	(Domain 8) Active Mining Area	(Domain 9) Future Mining Area	(Domain 10) Coal Handling Preparation Plant
Decommissioning	x	x	✓	x	x	x	x	x	x	x
Landform Establishment	x	x	x	✓	x	x	x	x	x	x
Growth Medium Development	x	x	x	✓	x	x	x	x	x	x
Ecosystem Establishment	x	x	x	✓	x	x	x	x	x	x
Ecosystem and Land Use Sustainability	x	x	x	✓	✓	✓	✓	x	x	x
Relinquished Lands	x	x	x	x	x	x	x	x	x	x

6.0 Performance Indicators and Completion Criteria

WCPL have prepared the following rehabilitation tables to address each rehabilitation phase during the MOP term as identified in **Table 22**. The rehabilitation tables provide the preliminary performance indicators and criteria to achieve the rehabilitation objectives applicable to each domain.

Although no decommissioning of infrastructure (other than decommissioning activities associated with Domain 3), is currently scheduled to occur during the MOP term, **Table 23** provides the appropriate performance indicators and criteria should WCPL require decommissioning of infrastructure during the term of the MOP in Domain 1 and Domain 2.

Landform establishment, growth medium development, ecosystem and land use establishment activities during the MOP term will primarily be undertaken in Domain 4 and Domain H. **Tables 23 to 27** provide the appropriate performance indicators and criteria applicable within Domain 4 during the MOP term. However, should areas within other Domains be identified for rehabilitation during the MOP term, these performance indicators and criteria will also apply.

Ecosystem and land use and sustainability activities during the MOP term will primarily be undertaken in Domain 4, Domain 5, Domain 6 and Domain 7. The objectives, indicators and completion criteria for each rehabilitation phase are specified in following tables:

- Decommissioning Phase – **Table 23**;
- Landform Establishment Phase – **Table 24**;
- Growth Medium Development Phase – **Table 25**;
- Ecosystem and Land Use Establishment Phase – **Table 26**; and
- Ecosystem and Land Use Sustainability Phase – **Table 27**.

WCPL have not identified areas within the mining lease that will be subject to relinquishment during the MOP term. As mining activities at WCPL are scheduled to continue past the MOP period and the Mine has an approved mine life until 2039, there will be no areas subject for lease relinquishment at the end of the MOP term. Therefore no Relinquishment Land Phase table has been developed for this MOP.

Further details regarding the rehabilitation activities during the MOP term are provided in **Section 7.0** of this MOP.

WCPL have developed preliminary completion criteria and indicators for each domain and rehabilitation phase. In consultation with the DRG, the preliminary completion criteria and associated rehabilitation tables will be reviewed and refined throughout this MOP period. The refinement of the criteria will involve, but not limited to, results from research and rehabilitation trials and monitoring results from the various monitoring programs and proposed monitoring programs as outlined in **Section 8.0**.

Where relevant, the performance indicators and preliminary completion criteria have been based on monitoring results collected from selected reference sites representative of the proposed post-mining land use for that domain (e.g. woodland corridors and pasture areas).

The refinement of the completion criteria during the MOP term will be utilised to quantitatively demonstrate the progress and ultimate rehabilitation success throughout the life of the mine.

Table 23 Rehabilitation Performance Indicators and Completion Criteria – Decommissioning Phase

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
Rehabilitation Phase - Decommissioning						
Domain 1 (Infrastructure), Domain 10 (Coal Handling Preparation Plant)						
<p>All infrastructure is removed that is not required post closure.</p> <p>All hazardous materials and contaminated materials removed.</p> <p>Entrances and shafts to underground mine workings sealed and made safe.</p> <p>Domain does not present a greater safety hazard than surrounding land.</p>	Removal of services	All redundant services (including electrical, water and communication services) have been disconnected and removed.	Condition 94, Schedule 4 of DA305-7-2003. <i>Table 18 Rehabilitation Objectives</i>	No	15	Ongoing Operations
	Removal of infrastructure	All redundant infrastructure (including all buildings, fixed plant and other infrastructure with no beneficial use at mine closure) has been demolished and removed from site.	Volume 1 - 2003 Project EIS: Section 5.7 <i>Mine Closure and Lease Relinquishment</i>	No		Ongoing Operations
	Removal of roads and car parks	Removal of hardstand areas, car parks, concrete footings and roadways (with no beneficial use) at post mining has been completed.	Section 6.3 Conceptual Mine Closure Plan	No		Ongoing Operations
	Removal of carbonaceous material	All carbonaceous material on the surface has been removed and disposed on-site within appropriate coarse reject emplacement areas.	Section 6.3 Conceptual Mine Closure Plan	No		Ongoing Operations
	Removal of hazardous materials	All hazardous materials have been classified in accordance with the EPA's <i>Waste Classification Guidelines</i> and removed from site.	Section 6.3 Conceptual Mine Closure Plan	No		Ongoing Operations
	Removal of wastes	All wastes generated during decommissioning have been classified in accordance with the EPA's <i>Waste Classification Guidelines</i> , and have been disposed and/or removed from site.	Section 6.3 Conceptual Mine Closure Plan	No		Ongoing Operations
	Land contamination	All land contamination assessments have been completed and all identified contaminated sites have been successfully remediated and verified by contamination specialists reports.	Section 6.3. Conceptual Mine Closure Plan	No		Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Seal underground portals	All underground portals have been sealed in accordance with the requirements of MDG6001 (<i>Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams</i>).	MDG6001 <i>Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams (February 2012)</i> - Mine Safety Operations NSW Trade & Investment).	No		Ongoing operations
	Seal ventilation shafts	All underground mine ventilation shafts have been sealed in accordance with MDG6001 (<i>Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams</i>).		No		Ongoing operations
	Management of mine water	All water discharged from site meets relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations
	Signs of spontaneous combustion	No spontaneous combustion evident at mine closure and during decommissioning.	Section 7.0 Conceptual Mine Closure Plan	No	6	Ongoing Operations
Domain 2 (Water Management)						
All infrastructure is removed that is not required post closure. All hazardous materials and contaminated materials removed. Domain does not present a greater safety hazard than surrounding land.	Removal of services	All redundant services have been disconnected and removed.	Condition 94, Schedule 4 of DA305-7-2003. <i>Table 18 Rehabilitation Objectives</i> Volume 1 - 2003 Project EIS: Section 5.7 <i>Mine Closure and Lease Relinquishment</i> Volume 1 - Section 6.1.3 Project 2003 EIS (Mine Closure Plan) Section 6.3 Conceptual Mine Closure Plan	No	15	Ongoing Operations
	Removal of infrastructure	All redundant infrastructure (including pumps, pontoons and pipelines) have been removed.		No	15	Ongoing Operations
	Dewater mine water dams	All mine water dams that are not required at post-closure have been completely dewatered.		No	15	Ongoing Operations
	Removal of contaminates	Removal of contaminated sediments from mine water dams has been completed. Removal of contaminated sediments verified in contamination specialists reports.		No	15	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Reshape mine water dam	Reshaping of mine water dams to their intended post mining use has been completed.		No	15	Ongoing Operations
	Management of mine water	All water discharged from site meets relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations
Domain 3 (Tailings Emplacement)						
<p>All infrastructure is removed that is not required post closure.</p> <p>All hazardous materials and contaminated materials removed.</p> <p>Domain does not present a greater safety hazard than surrounding land.</p>	Removal of services	All redundant services have been disconnected and removed.	Condition 94, Schedule 4 of DA305-7-2003. <i>Table 18 Rehabilitation Objectives</i>	No	15	Ongoing Operations
	Removal of infrastructure	All redundant infrastructure has been removed.	Volume 1 - 2003 Project EIS: Section 5.7 <i>Mine Closure and Lease Relinquishment</i>	No	15	Ongoing Operations
	Removal of supernatant water	Dewatering (where necessary) of remaining surface water above tailings has been completed.	Volume 1 - Section 6.1.3 Project 2003 EIS (Mine Closure Plan)	No	15	Ongoing Operations
	Desiccation of tailings	Desiccation of tailings completed and permits a trafficable surface. Confirmation of trafficable surface verified in geotechnical reports.	<i>Work Health and Safety (Mines) Regulation 2014 [NSW] Schedule 3 High risk activities.</i>	No	15	Ongoing Operations
	Signs of spontaneous combustion	No spontaneous combustion evident during decommissioning.	Section 5.6 Conceptual Mine Closure Plan	No	6	Ongoing Operations
	Management of mine water	All water discharged from site meets relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
Domain 4 (Waste Rock Emplacement Areas), Domain 5 (Subsidence Area), Domain 6 (Rehabilitation Pre-MOP), Domain 8 (Active Mining Area), Domain 9 (Future Mining)						
<p>All infrastructure is removed that is not required post closure.</p> <p>All hazardous materials and contaminated materials removed.</p> <p>Domain does not present a greater safety hazard than surrounding land.</p>	Removal of services	All redundant services have been disconnected and removed.	Condition 94, Schedule 4 of DA305-7-2003. <i>Table 18 Rehabilitation Objectives</i> Volume 1 - 2003 Project EIS:	No	15	Ongoing Operations
	Removal of infrastructure	All redundant infrastructure has been removed.	<i>Section 5.7 Mine Closure and Lease Relinquishment</i>	No	15	Ongoing Operations
	Removal of carbonaceous material	All carbonaceous material on the surface has been removed and disposed on-site within appropriate coarse reject emplacement areas.	Section 6.3 Conceptual Mine Closure Plan	No		Ongoing Operations
	Signs of spontaneous combustion	No spontaneous combustion evident during decommissioning.	Section 6.3 Conceptual Mine Closure Plan	No	6	Ongoing Operations
	Subsidence cracking	No subsidence surface cracks remaining that present a risk to the environment, safety and the final land use objectives.	Section 5.11 Conceptual Mine Closure Plan	No	14	Ongoing Operations
	Management of mine water	All water discharged from site meets relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
Domain 7 (North Wambo Creek Diversion)						
<p>All infrastructure is removed that is not required post closure.</p> <p>All hazardous materials and contaminated materials removed.</p> <p>Domain does not present a greater safety hazard than surrounding land.</p>	Removal of services	All redundant services have been disconnected and removed.	Section 6.3 Conceptual Mine Closure Plan	No	15	Ongoing Operations
	Removal of infrastructure	All redundant infrastructure has been removed.	Section 6.3 Conceptual Mine Closure Plan	No	15	Ongoing Operations
	Management of surface water	Water quality discharged from diversion meets water quality trigger values for North Wambo Creek, under normal flow conditions, as provided in the SWMP.	<p>Section 6.4 Conceptual Mine Closure Plan</p> <p>Surface Water Monitoring Program</p>	No	12	Ongoing Operations

Table 24 Rehabilitation Performance Indicators and Completion Criteria – Landform Establishment Phase

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
Rehabilitation Phase – Landform Establishment						
Domain 1 (Infrastructure), Domain 4 (Waste Rock Emplacement Areas), Domain 8 (Active Mining Area), Domain 9 (Future Mining), Domain 10 (Coal Handling Preparation Plant)						
<p>All hazardous materials and contaminated materials removed.</p> <p>Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land.</p> <p>Mined land will be re-contoured to a landform compatible with the surrounding natural landscape.</p> <p>Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses.</p> <p>Final landforms are consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.</p>	Waste rock material characterisation	Material characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.	Volume 1 - Section 5.3 of the Project 2003 EIS (Final Landform Design Concepts)	No	4	Ongoing Operations
	Application of ameliorants	Application of appropriate soil ameliorants applied (at specified rates) has been completed.	Section 5.6 Conceptual Mine Closure Plan	No	4	Ongoing Operations
	pH	Soil pH (H ₂ O) range: pH 5.5 – pH 7.8	Volume 4, Appendix G Tailings Management Project 2003 EIS	No	4	Ongoing Operations
	Electrical conductivity (EC)	Soil EC (H ₂ O) ≤1200 µS/cm	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)	No	4	Ongoing Operations
	Coarse rejects capped	Coarse rejects capped with a minimum of 2m of inert overburden material.	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	6	Ongoing Operations
	Coarse rejects on surface	No coarse rejects within the waste rock emplacement areas to be within 2m of the final landform surface RL.	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	6	Ongoing Operations
	Large rocks on surface	Rock racking of the final landform completed to remove rocks >200mm in diameter.	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)	No	6	Ongoing Operations
	Slope gradients	No greater than 1:6 (10 degrees or 17%) across the entire ML area (unless otherwise agreed by DRG).	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	8	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Slope lengths	Slope length within range of 50 m – 80 m (subject to slope gradient)	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)	No	7	Ongoing Operations
	Landform stability	No slumping evident.	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)	No	6	Ongoing Operations
	Final landform height	Final landform height ≤160 m AHD.	Volume 1 - Section 5.3 of the Project 2003 EIS (Final Landform Design Concepts)	No	8	Ongoing Operations
	Slope shape (Preferred Profile)	Mine waste rock emplacement slopes constructed to form an 'S' shape with the upper nominally at 20 to 30% being convex and the lower 70 to 80% being concave.	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	8	Ongoing Operations
	Slope shape (Profile design when external features limit the Preferred Profile)	Mine waste rock emplacement slopes constructed with a "back-sloped bench", approximately 4 m wide, constructed on the contour approximately mid-point of the slope.	Section 5.6 Conceptual Mine Closure Plan	No	8	Ongoing Operations
	Drainage designs	Drainage lines with <3% fall have been appropriately armoured.	Volume 1 - Section 5.3 of the Project 2003 EIS (Final Landform Design Concepts)	No	6	Ongoing Operations
	Landform drainage	Reinstatement of natural drainage patterns (where possible).	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	6	Ongoing Operations
	Signs of spontaneous combustion	No spontaneous combustion evident during decommissioning.	Section 6.3 Conceptual Mine Closure Plan	No	6	Ongoing Operations
	Acid mine drainage (AMD)	No evidence of AMD.	Appendix G of Project EIS 2003 Waste Rock and CHPP Rejects/Tailings Management	No	6	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13	Ongoing Operations
	Management of mine water	Water runoff is contained and managed within internal water management system. No water discharged from site, unless relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529 can be achieved.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations
Domain 2 (Water Management)						
<p>Preservation of existing beneficial use of water resources.</p> <p>Provide a self-sustaining land form post mine closure.</p> <p>Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses.</p>	Dam dewatering	Mine water from dam returned to mine water system.	<p>Volume 1 - Section 5.3 of the Project 2003 EIS (Final Landform Design Concepts) Section 6.3 Conceptual Mine Closure Plan</p>	No	15	Ongoing Operations
	Contaminates removal	Contaminates removed from dam and placed within open cut voids is completed.		No	15	Ongoing Operations
	Dam reshaping	Re-shaping dams (where required) in accordance with their intended use completed.		No	15	Ongoing Operations
	Material characterisation	Material characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.		No	4	Ongoing Operations
	Application of ameliorants	Application of appropriate soil ameliorants applied (at specified rates) has been completed.		No	3	Ongoing Operations
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.		Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Management of mine water	Water runoff is contained and managed within internal water management system. No water discharged from site, unless relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529 can be achieved.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations
Domain 3 (Tailings Employment)						
<p>All hazardous materials and contaminated materials removed.</p> <p>Design of capping to prevent soil erosion and exposure to tailings material beneath.</p> <p>Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land.</p> <p>Mined land will be re-contoured to a landform compatible with the surrounding natural landscape.</p>	Tailings capping	Tailings capped with 2m to 5m (subject to final design requirements) of inert overburden material.	Approvals granted under <i>Work Health and Safety (Mines) Regulation 2014 [NSW] Schedule 3 High risk activities</i>	No	5	Ongoing Operations
	Capping drainage	Capping layer has been designed to allow for surface water runoff, with slope grades of <1%.	Section 5.10 Conceptual Mine Closure Plan	No	5	Ongoing Operations
	Capping landform	Capping layer has been re-profiled and is compatible with the local surrounding landscape.	Volume 1 - Section 5 of the Project 2003 EIS (Final Landform Design Concepts)	No	5	Ongoing Operations
	Material characterisation	Material characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.	Volume 1 - Section 5.3 of the Project 2003 EIS (Final Landform Design Concepts)	No	4	Ongoing Operations
	Application of ameliorants	Application of appropriate soil ameliorants applied (at specified rate) has been completed.	Section 5.6 Conceptual Mine Closure Plan	No	4	Ongoing Operations
	pH	Soil pH (H ₂ O) range: pH 5.5 – pH 7.8	Volume 4, Appendix G Tailings Management Project 2003 EIS	No	4	Ongoing Operations
	Electrical conductivity (EC)	Soil EC (H ₂ O) ≤1200 µS/cm	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)	No	4	Ongoing Operations
	Spontaneous combustion	No spontaneous combustion evident at mine closure and during landform establishment.	Section 6.3 Conceptual Mine Closure Plan	No	6	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13	Ongoing Operations
	Management of mine water	Water runoff is contained and managed within internal water management system. No water discharged from site, unless relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529 can be achieved.	Section 6.3 Conceptual Mine Closure Plan EPL 529	No	12	Ongoing Operations
Domain 5 (Subsidence Area)						
Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options. All watercourses subject to subsidence impacts shall be hydraulically and geomorphologically stable.	Subsidence cracking	No subsidence surface cracks remaining that present a risk to the environment, safety and the final land use objectives. Remediation of surface cracks >50 mm.	Section 5.11 Conceptual Mine Closure Plan SBU Extraction Plan LW11-16	No	14	Ongoing Operations
	Creek stability	Creeks affected by subsidence have been repaired and their functionality and stability has been confirmed by a hydrological engineer (or equivalent).	DA305-7-2003	No	14	Ongoing Operations
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Groundcover is >60%. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan SBU Extraction Plan LW11-16 Erosion and Sedimentation Control Plan	No	13	Ongoing Operations
Domain 6 (Rehabilitation Pre-MOP), Domain D (Rehabilitation – Mixed Pasture/Woodland), Domain E (Rehabilitation – Woodland Corridors), Domain H (Rehabilitation Pasture)						
Land capability returned to a class similar to that existing prior to disturbance (i.e. Class III). Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options.	Subsidence cracking	No subsidence surface cracks remaining that present a risk to the environment, safety and the final land use objectives.	Section 5.11 Conceptual Mine Closure Plan	No	14	Ongoing Operations
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
Domain 7 (North Wambo Creek Diversion)						
<p>Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options.</p> <p>All watercourses subject to subsidence impacts shall be hydraulically and geomorphologically stable.</p> <p>Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land</p> <p>Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses.</p>	Management of surface water	Water quality discharged from diversion meets water quality trigger values for North Wambo Creek under normal flow conditions, as provided in the SWMP.	Section 6.4 Conceptual Mine Closure Plan Surface Water Monitoring Program	No	12	Ongoing Operations
	Subsidence cracking	No subsidence surface cracks remaining that present a risk to the environment, safety and the final land use objectives. Remediation of surface cracks >50 mm.	Section 5.11 Conceptual Mine Closure Plan	No	14	Ongoing Operations
	Creek stability	Creeks affected by subsidence have been repaired and their functionality and stability has been confirmed by a hydrological engineer (or equivalent). Remediation of all visible surface cracks in the low flow channel as soon as practicable.	DA305-7-2003 SBU Extraction Plan LW11-16	No	14	Ongoing Operations
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Groundcover is >60%. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan SBU Extraction Plan LW11-16 Erosion and Sedimentation Control Plan	No	13	Ongoing Operations

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
Domain F (Final Void)						
<p>All hazardous materials and contaminated materials removed.</p> <p>All infrastructure removed that is not required post closure.</p> <p>Provide a self-sustaining land form post mine closure.</p> <p>Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses.</p>	Surface water management	Surface water inflows to the final voids have been minimised through appropriate land forming and water management structures.	<p>Volume 1, Section 5.3.4 Project EIS 2003 (Final Voids)</p> <p>Volume 1, Section 6.1.3 Project EIS 2003 (Mine Closure Plan)</p> <p>Final Void Management Plan³⁹</p> <p>NOTE: To be updated in revised CMCP.</p>	No	16	Ongoing Operations
	Geotechnically stable	Final voids have been geotechnically designed and profiled for long term stability.		No	16	Ongoing Operations
	Perimeter bunding	Perimeter bunding has been formed around final voids to reduce the risk for all flood events.		No	16	Ongoing Operations
	Safety fencing	Safety fencing erected to limit public access to voids		No	16	Ongoing Operations
	Carbonaceous material	No exposed carbonaceous materials remaining in the final void floor.		No	16	Ongoing Operations
	Covered coal seams	Coal seams sufficiently backfilled with overburden material so no coal seams are exposed in accordance with Final Void Management Plan.		No	16	Ongoing Operations
	Void design	Final void design in accordance with the Final Void Management Plan.		No	16	Ongoing Operations

Table 25 Rehabilitation Performance Indicators and Completion Criteria – Growth Medium Development Phase

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP									
Rehabilitation Phase – Growth Medium Development Phase															
Domain 1 (Infrastructure), Domain 3 (Tailings Emplacement Areas), Domain 4 (Waste Rock Emplacement Areas), Domain 8 (Active Mining), Domain 9 (Future Mining), Domain 10 CHPP															
<p>All hazardous materials and contaminated materials removed.</p> <p>Provide a growth medium that is suitable for the establishment and maintenance of the selected revegetation species to achieve the final land use.</p> <p>Provide a growth medium that has physical and chemical properties comparable with reference sites.</p> <p>Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and/or VI).</p>	Topsoil depth	Topsoil has been applied at a minimum of approximately 100mm thickness in all areas and/or otherwise been achieved with the addition of humus/compost material to form a topsoil/composite mix.	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	1	Ongoing operations									
	Topsoil characterisation	Topsoil characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)		3										
	Topsoil (pH)	Soil pH (H ₂ O) range: pH 5.5 – pH 7.8	Appendix G Project EIS 2003 (Waste Rock and CHPP Rejects and Tailings Management)	No	3	Ongoing operations									
	Topsoil Electrical conductivity (EC)	Soil EC (H ₂ O) ≤1200 µS/cm	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)		3										
	Topsoil (Phosphorous)	<table border="1"> <thead> <tr> <th>Phosphate Test Method</th> <th>Productive Pasture</th> <th>Native Vegetation</th> </tr> </thead> <tbody> <tr> <td>Colwell</td> <td>20-40 mg/kg</td> <td>10-20 mg/kg</td> </tr> <tr> <td>Bray</td> <td>12-22 mg/kg</td> <td>6-12 mg/kg</td> </tr> </tbody> </table>	Phosphate Test Method		Productive Pasture		Native Vegetation	Colwell	20-40 mg/kg	10-20 mg/kg	Bray	12-22 mg/kg	6-12 mg/kg	<i>Hazelton, P.A., Murphy, B.W. (1992); A Guide for the Interpretation of Soil Test Results, NSW Dept Conservation and Land Management.</i>	3
	Phosphate Test Method	Productive Pasture	Native Vegetation												
	Colwell	20-40 mg/kg	10-20 mg/kg												
	Bray	12-22 mg/kg	6-12 mg/kg												
Topsoil (Organic Carbon)	Organic Matter % (g/100g) >3%		3												
Application of ameliorants	Application of appropriate soil ameliorants (at specified rate) has been completed.	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	3	Ongoing operations										
Topsoil ripping	Ripping has been carried out to an approximate depth of 300 mm to 500 mm on the contour. Full and continuous ripping has been undertaken between rip lines.	<i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)		1											

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Topsoil stockpile	Stockpiles which are to be inactive for extended periods have been fertilised and seeded with annual cover crop and/or preferred native pasture species (Table 17).	Volume 1 - Section 5 Rehabilitation, Project EIS 2003 <i>Rehabilitation Standards for Wambo Coal</i> (Global Soil Systems, February 2009)	No	2	Ongoing operations
	Topsoil stockpile signage	Once constructed, the topsoil stockpiles have been signposted. Barriers constructed if necessary.			2	
	Topsoil stockpile location	No topsoil stockpiles are to be placed in the invert of drainage lines or drainage works.			2	
	Exotic cover	Biometric monitoring confirms exotic cover <33%.	Biodiversity Management Plan	No	11	Ongoing operations
	Management of mine water	Water runoff is contained and managed within internal water management system. No water discharged from site, unless relevant volumes and quality as specified by Environment Protection Licence (EPL) No. 529 can be achieved.	Erosion and Sediment Control Plan (ESCP) EPL 529	No	12	Ongoing operations
	Water quality	Water quality discharged from diversion meets water quality trigger values for North Wambo Creek under normal flow conditions, as provided in the SWMP.	Surface Water Monitoring Program	No	12	Ongoing operations
	Spontaneous combustion	No spontaneous combustion evident.	Section 6.3 Conceptual Mine Closure Plan	No	6	Ongoing Operations
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13	Ongoing operations

Table 26 Rehabilitation Performance Indicators and Completion Criteria – Ecosystem and Land Use Establishment Phase

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP							
Rehabilitation Phase – Ecosystem and Land Use Establishment Phase													
Domain 1 (Infrastructure), Domain 3 (Tailings Emplacement Areas), Domain 4 (Waste Rock Emplacement Areas), Domain 7 (North Wambo Creek Diversion), Domain 8 (Active Mining), Domain 9 (Future Mining), Domain 10 CHPP, Domain D (Mixed Woodland/Pasture Areas), Domain E (Woodland Corridors)													
Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and Class VI) Mixed Woodland/Pasture Areas established consistent with revegetation strategy. Woodland Corridor Areas established consistent with revegetation strategy. Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of	Ground cover	Minimum 70% of area has a vegetative cover. No single bare area <20m ²	Erosion and Sediment Control Plan	No	11	Ongoing operations							
	Habitat Augmentation	Where appropriate and practical salvaged tree hollows, timber logs etc will be incorporated into the final landform to augment the habitat value.	Volume 1 - Section 5 Rehabilitation, Project EIS 2003	No	17	Ongoing operations							
	LFA (Woodland Rehabilitation) LFA (Pasture/Woodland) LFA (Riparian)	A colour system in the BMP highlights the performance of each LFA site within each rehabilitation area. <table border="1" data-bbox="660 829 1518 1088"> <thead> <tr> <th>Green</th> <th>Yellow</th> <th>Orange</th> <th>Red</th> </tr> </thead> <tbody> <tr> <td>Area is generally meeting or exceeding target values and values do not show trend of decline over time – where monitoring sites are meeting targets and values are relatively consistent, reduce monitoring to infrequent LFA when changes in landscape or management practices occur (i.e. fire or grazing)</td> <td>Area generally falls below target values but within 75% of targets or appears to be on a trajectory of improvement without the need for management intervention – further monitoring required</td> <td>Area generally falls between 75% and 50% of target values or shows little sign of improvement over several monitoring events – further monitoring and possibly management actions required</td> <td>Area falls below 50% of target and is unlikely to improve without management actions or shows trend of decline which is unlikely to improve without management actions</td> </tr> </tbody> </table>	Green	Yellow	Orange	Red	Area is generally meeting or exceeding target values and values do not show trend of decline over time – where monitoring sites are meeting targets and values are relatively consistent, reduce monitoring to infrequent LFA when changes in landscape or management practices occur (i.e. fire or grazing)	Area generally falls below target values but within 75% of targets or appears to be on a trajectory of improvement without the need for management intervention – further monitoring required	Area generally falls between 75% and 50% of target values or shows little sign of improvement over several monitoring events – further monitoring and possibly management actions required	Area falls below 50% of target and is unlikely to improve without management actions or shows trend of decline which is unlikely to improve without management actions	Tongway, D.J. and Hindley, N.L.,2004. <i>Landscape function analysis. Procedures for monitoring and assessing landscapes.</i> CSIRO Sustainable Ecosystems, Canberra.	No	10
Green	Yellow	Orange	Red										
Area is generally meeting or exceeding target values and values do not show trend of decline over time – where monitoring sites are meeting targets and values are relatively consistent, reduce monitoring to infrequent LFA when changes in landscape or management practices occur (i.e. fire or grazing)	Area generally falls below target values but within 75% of targets or appears to be on a trajectory of improvement without the need for management intervention – further monitoring required	Area generally falls between 75% and 50% of target values or shows little sign of improvement over several monitoring events – further monitoring and possibly management actions required	Area falls below 50% of target and is unlikely to improve without management actions or shows trend of decline which is unlikely to improve without management actions										

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP																																																		
<p>downstream watercourses.</p> <p>Soil properties are suitable for the establishment and maintenance of selected vegetation species</p> <p>Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park.</p> <p>Pasture Areas established consistent with analogue pasture communities.</p> <p>Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options.</p>		<p>Target scores were developed to provide quantitative measures that can be used to compare rehabilitation areas with reference sites throughout the course of the monitoring program. These scores were developed using the baseline data and data from nearby sites within relatively undisturbed riparian habitat. Target scores are provided in below, along with the average scores from the 2015 baseline monitoring program</p> <table border="1"> <thead> <tr> <th>Site Type</th> <th></th> <th>LOI</th> <th>SI</th> <th>INFI</th> <th>NI</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Woodland Rehabilitation</td> <td>Average Score</td> <td>0.77</td> <td>56.58</td> <td>40.43</td> <td>33.95</td> </tr> <tr> <td>Target Score</td> <td>>0.87</td> <td>>59</td> <td>>43</td> <td>>36</td> </tr> <tr> <td rowspan="2">Pasture Rehabilitation</td> <td>Average Score</td> <td>0.84</td> <td>60.03</td> <td>38.64</td> <td>31.86</td> </tr> <tr> <td>Target Score</td> <td>>0.93</td> <td>>61</td> <td>>29</td> <td>>25</td> </tr> <tr> <td rowspan="2">North Wambo Creek Diversion</td> <td>Average Score</td> <td>0.56</td> <td>53.26</td> <td>28.76</td> <td>19.34</td> </tr> <tr> <td>Target Score</td> <td>>0.84</td> <td>>62</td> <td>>41</td> <td>>37</td> </tr> <tr> <td rowspan="2">Wambo Creek</td> <td>Average Score</td> <td>0.67</td> <td>52.3</td> <td>45.0</td> <td>29.6</td> </tr> <tr> <td>Target Score</td> <td>>0.84</td> <td>>62</td> <td>>41</td> <td>>37</td> </tr> </tbody> </table>	Site Type		LOI	SI	INFI	NI	Woodland Rehabilitation	Average Score	0.77	56.58	40.43	33.95	Target Score	>0.87	>59	>43	>36	Pasture Rehabilitation	Average Score	0.84	60.03	38.64	31.86	Target Score	>0.93	>61	>29	>25	North Wambo Creek Diversion	Average Score	0.56	53.26	28.76	19.34	Target Score	>0.84	>62	>41	>37	Wambo Creek	Average Score	0.67	52.3	45.0	29.6	Target Score	>0.84	>62	>41	>37	Biodiversity Management Plan	No	10	Ongoing operations
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Management of mine water	Water runoff is contained and managed within internal water management system. No water discharged from site, unless relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529 can be achieved.		Erosion and Sediment Control Plan (ESCP) EPL 529	No	12	Ongoing operations																																																		
Water quality	Water quality discharged from diversion meets water quality trigger values for North Wambo Creek under normal flow conditions, as provided in the SWMP.		Surface Water Monitoring Program	No	12	Ongoing operations																																																		
		The ongoing use of LFA will be result-based, with achievement of a self-sustaining stable landform no longer requiring further monitoring.																																																						

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Spontaneous combustion	No spontaneous combustion evident.	Section 6.3 Conceptual Mine Closure Plan	No	6	Ongoing Operations
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13	Ongoing operations

Table 27 Rehabilitation Performance Indicators and Completion Criteria – Ecosystem and Land Use Stability Phase

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP																																													
Rehabilitation Phase – Ecosystem and Land Use Establishment Phase																																																			
Domain 1 (Infrastructure), Domain 3 (Tailings Emplacement Areas), Domain 4 (Waste Rock Emplacement Areas), Domain 7 (North Wambo Creek Diversion), Domain 8 (Active Mining), Domain 9 (Future Mining), Domain 10 CHPP, Domain D (Mixed Woodland/Pasture Areas), Domain E (Woodland Corridors)																																																			
<p>Land capability returned to a class similar to that existing prior to the commencement of mining (i.e. Class V and Class VI)</p> <p>Mixed Woodland/Pasture Areas established consistent with revegetation strategy.</p> <p>Woodland Corridor Areas established consistent with revegetation strategy.</p> <p>Rehabilitated landforms will be designed to shed water safely without causing excessive erosion, jeopardising landform</p>	<p>LFA (Woodland Rehabilitation)</p> <p>LFA (Pasture/Woodland)</p> <p>LFA (Riparian)</p>	<p>A green, yellow, orange and red colour system has been developed to rank each measured attribute according to the performance and management actions required. This colour ranking system is shown below. The number of hollow-bearing trees and length of fallen logs have been presented as a measure of fauna habitat attributes. However no performance criteria has been set for these attributes in remnant vegetation, as in some cases it may take many years (50+) for a suitable density of hollows and logs to form naturally.</p> <table border="1"> <thead> <tr> <th>Site Attribute</th> <th>Red (needs greater improvement)</th> <th>Orange (in need of improvement)</th> <th>Yellow (Not meeting target but values still acceptable)</th> <th>Green (Excellent – within target range)</th> </tr> </thead> <tbody> <tr> <td>Native Plant Species Richness (NPS)</td> <td>0-10%</td> <td>>10-<50% of target range</td> <td>50-<100% of target range</td> <td>≥ target range</td> </tr> <tr> <td>Native Overstorey Cover (NOS)</td> <td>0-10% or >200% of target range</td> <td>>10-<50% or >150-200% of target range</td> <td>50-<100% or >100-150% of target range</td> <td>Within target range</td> </tr> <tr> <td>Native Midstorey Cover (NMS)</td> <td>0-10% or >200% of target range</td> <td>>10-<50% or >150-200% of target range</td> <td>50-<100% or >100-150% of target range</td> <td>Within target range</td> </tr> <tr> <td>Native Ground Cover – grasses (NGCG)</td> <td>0-10% or >200% of target range</td> <td>>10-<50% or >150-200% of target range</td> <td>50-<100% or >100-150% of target range</td> <td>Within target range</td> </tr> <tr> <td>Native Ground Cover – shrubs (NGCS)</td> <td>0-10% or >200% of target range</td> <td>>10-<50% or >150-200% of target range</td> <td>50-<100% or >100-150% of target range</td> <td>Within target range</td> </tr> <tr> <td>Native Ground Cover – other (NGCO)</td> <td>0-10% or >200% of target range</td> <td>>10-<50% or >150-200% of target range</td> <td>50-<100% or >100-150% of target range</td> <td>Within target range</td> </tr> <tr> <td>Proportion of native overstorey species regenerating (OR) in vegetation zone</td> <td>0</td> <td>0-0.5</td> <td>0.5-1</td> <td>1</td> </tr> <tr> <td>Exotic plant cover (EPC)</td> <td>>66%</td> <td>33-66%</td> <td>5-33%</td> <td>0-5%</td> </tr> </tbody> </table>	Site Attribute	Red (needs greater improvement)	Orange (in need of improvement)	Yellow (Not meeting target but values still acceptable)	Green (Excellent – within target range)	Native Plant Species Richness (NPS)	0-10%	>10-<50% of target range	50-<100% of target range	≥ target range	Native Overstorey Cover (NOS)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range	Native Midstorey Cover (NMS)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range	Native Ground Cover – grasses (NGCG)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range	Native Ground Cover – shrubs (NGCS)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range	Native Ground Cover – other (NGCO)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range	Proportion of native overstorey species regenerating (OR) in vegetation zone	0	0-0.5	0.5-1	1	Exotic plant cover (EPC)	>66%	33-66%	5-33%	0-5%	<p>WCPL's Completion Criteria and monitoring program has been developed based on the Biometric (Gibbons et al 2009)</p> <p>Biodiversity Management Plan</p>	No	10	Ongoing operations
		Site Attribute	Red (needs greater improvement)	Orange (in need of improvement)	Yellow (Not meeting target but values still acceptable)	Green (Excellent – within target range)																																													
		Native Plant Species Richness (NPS)	0-10%	>10-<50% of target range	50-<100% of target range	≥ target range																																													
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		Native Midstorey Cover (NMS)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range																																													
		Native Ground Cover – grasses (NGCG)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range																																													
		Native Ground Cover – shrubs (NGCS)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range																																													
		Native Ground Cover – other (NGCO)	0-10% or >200% of target range	>10-<50% or >150-200% of target range	50-<100% or >100-150% of target range	Within target range																																													
		Proportion of native overstorey species regenerating (OR) in vegetation zone	0	0-0.5	0.5-1	1																																													
Exotic plant cover (EPC)	>66%	33-66%	5-33%	0-5%																																															

Objectives	Performance Indicator	Completion Criteria										Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP		
<p>geotechnical integrity or increasing pollution of downstream watercourses.</p> <p>Soil properties are suitable for the establishment and maintenance of selected vegetation species</p> <p>Establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park;</p> <p>Pasture Areas established consistent with analogue pasture communities.</p> <p>Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options</p>		<p>Completion criteria for seven Plant Community Types (PCT) present within the RWEPP areas has been developed considering both the baseline data collected during the 2014/2015 monitoring program and OEH benchmark values for each PCT . This criterion is included below, along with the average value calculated from the site value scores for each monitoring plot within the PCT.</p>										<p>WCPL's Completion Criteria and monitoring program has been developed based on the Biometric (Gibbons et al 2009)</p> <p>Biodiversity Management Plan</p>	No	9	Ongoing operations		
		Plant Community Type (PCT)	NPS	NOS (%)	NMS (%)	NGC G	NGC S	NGC O	EPC	OR	HBT					FL	
		PCT 42: River Red Gum / River Oak riparian woodland wetland in the Hunter Valley	Average Value	14.3	15.3	14.5	28.9	1.1	6.9	38.3	1					0	14.9
			Benchmark Value	38	10-50	10-50	20-60	1-5	10-30	<5	1					0.1	10
			Completion Criteria	>20	10-50	10-50	20-60	1-5	5-30	<10	1					-	-
		PCT 1658: Rough barked Apple–Narrow leaved Ironbark-Blakely's Red Gum-Bull Oak–Coast Banksia woodland on sands of the Warkworth area	Average Value	27	11.8	10.8	19.5	3.5	31	10.4	1					1	13.9
			Benchmark Value	26	13-40	10-50	4-15	5-30	5-25	0	1					0.8	20
			Completion Criteria	>20	10-40	10-50	4-20	5-30	5-35	<10	1					-	-
		PCT 1603: Narrow leaved Ironbark – Bull Oak - Grey Box shrub- grass open forest of the central and lower Hunter	Average Value	29	13.8	9.2	26	7.4	4	0.2	1					0.7	26.35
			Benchmark Value	41	15-40	5-10	30-50	5-10	20-40	<5	1					3	5
Completion Criteria	>25		10-40	5-10	15-50	5-10	5-40	<5	1	-	-						

Objectives	Performance Indicator	Completion Criteria										Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP	
		Plant Community Type (PCT)	NPS	NOS (%)	NMS (%)	NGC G	NGC S	NGC O	EPC	OR	HBT					FL
		PCT1604: Narrow leaved Ironbark – Grey Box - Spotted Gum shrub - grass of the central and lower Hunter	35	22.5	7.2	34	8	5.3	0	1	0	35.3	WCPL's Completion Criteria and monitoring program has been developed based on the Biometric (Gibbons et al 2009) Biodiversity Management Plan	No	9	Ongoing operations
		Benchmark Value	41	15-40	5-20	30-50	5-10	20-40	<5	1	3	5				
		Completion Criteria	>35	15-40	5-20	30-50	5-15	5-40	<5	1	-	-				
		Average Value	31	12.1	11.6	23.5	3	6	0	1	0	26				
		PCT1176: Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	21	19-42	6-24	5-20	0-25	2-10	<5	1	1	30				
		Benchmark Value	21	19-42	6-24	5-20	0-25	2-10	<5	1	1	30				
		Completion Criteria	21	15-40	5-30	5-30	0-25	2-10	<5	1	-	-				
		Average Value	50	10.5	19	70	16	8	0	1	0	25				
		PCT 1584: White Mahogany – Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	50	10.5	19	70	16	8	0	1	0	25				
		Benchmark Value	21	19-42	6-24	5-20	0-25	2-10	<5	1	1	30				

Objectives	Performance Indicator	Completion Criteria										Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP		
		Plant Community Type (PCT)	NPS	NOS (%)	NMS (%)	NGC G	NGC S	NGC O	EPC	OR	HBT					FL	
		PCT 1584: White Mahogany – Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley PCT 1603: Narrowleaved Ironbark – Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter *	Benchmark Value	51	22-45	5-40	5-25	10-20	5-20	<5	1	1	20				
		PCT 1584: White Mahogany – Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley PCT 1603: Narrowleaved Ironbark – Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter *	Completion Criteria	>45	15-45	5-40	5-40	10-20	5-20	0	1	-	-				
			Average Value	39	5.5	25.7	40.7	6.7	12.6	4	1	0	12.6				
		PCT 1603: Narrowleaved Ironbark – Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter *	Benchmark Value	41	15-40	5-10	30-50	5-10	20-40	<5	1	3	5				
		PCT 1603: Narrowleaved Ironbark – Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter *	Completion Criteria	>30	5-40	5-40	30-50	5-10	10-40	<5	1	-	-				

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP																														
		<table border="1"> <thead> <tr> <th></th> <th>NPS</th> <th>NOS (%)</th> <th>NMS (%)</th> <th>NGCG</th> <th>NGCS</th> <th>NGCO</th> <th>EPC</th> <th>OR</th> <th>FL</th> </tr> </thead> <tbody> <tr> <td>Older Woodland Rehabilitation on areas with a canopy of Sugar Gum</td> <td>>15</td> <td>15-40</td> <td>5-40</td> <td>5-15</td> <td>5-10</td> <td>5-15</td> <td><20</td> <td>1</td> <td>5</td> </tr> <tr> <td>Rehabilitated areas of Narrow-leaved Ironbark – Bull Oak - Grey Box open forest</td> <td>>20</td> <td>10-40</td> <td>5-10</td> <td>15-50</td> <td>5-10</td> <td>5-40</td> <td><20</td> <td>1</td> <td>-</td> </tr> </tbody> </table>		NPS	NOS (%)	NMS (%)	NGCG	NGCS	NGCO	EPC	OR	FL	Older Woodland Rehabilitation on areas with a canopy of Sugar Gum	>15	15-40	5-40	5-15	5-10	5-15	<20	1	5	Rehabilitated areas of Narrow-leaved Ironbark – Bull Oak - Grey Box open forest	>20	10-40	5-10	15-50	5-10	5-40	<20	1	-	WCPL's Completion Criteria and monitoring program has been developed based on the Biometric (Gibbons et al 2009) Biodiversity Management Plan	No	9	Ongoing operations
	NPS	NOS (%)	NMS (%)	NGCG	NGCS	NGCO	EPC	OR	FL																											
Older Woodland Rehabilitation on areas with a canopy of Sugar Gum	>15	15-40	5-40	5-15	5-10	5-15	<20	1	5																											
Rehabilitated areas of Narrow-leaved Ironbark – Bull Oak - Grey Box open forest	>20	10-40	5-10	15-50	5-10	5-40	<20	1	-																											
	Exotic cover	Biometric monitoring confirms exotic cover <20%.	Biodiversity Management Plan	No	11	Ongoing operations																														
	Management of mine water	Water runoff is contained and managed within internal water management system. No water discharged from site, unless relevant volumes and quality as specified by Environmental Protection Licence (EPL) No. 529 can be achieved.	Erosion and Sediment Control Plan (ESCP) EPL 529	No	13	Ongoing operations																														
	Water quality	Water quality discharged from diversion meets water quality trigger values for North Wambo Creek under normal flow conditions, as provided in the SWMP.	Surface Water Monitoring Program	No	13	Ongoing operations																														
	Spontaneous combustion	No spontaneous combustion evident.	Section 6.3 Conceptual Mine Closure Plan	No	6	Ongoing Operations																														
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200mm deep and/or >200mm wide. Appropriate erosion controls are in place and effective.	Section 5.6.2 Conceptual Mine Closure Plan Erosion and Sedimentation Control Plan	No	13	Ongoing operations																														

Objectives	Performance Indicator	Completion Criteria	Justification	Complete (Yes/No)	TARP Ref No#	Progress at start of MOP
	Terrestrial fauna	Fauna monitoring will be used to qualitatively validate BioMetric and LFA monitoring results (i.e. self-sustaining stable landforms and vegetation structure have been successfully recreated or reintroduced and are being inhabited or frequented by local fauna).	Biodiversity Management Plan	No	17	Ongoing operations
	Feral animals	Annual feral animal control program implemented. Ecological monitoring confirms t feral animal control program effective.	Biodiversity Management Plan	No	17	Ongoing operations
	Bushfire management	Mitigation actions have been implemented as required by the Bushfire Management Plan.	Bush Fire Management Plan	No	18	Ongoing operations
	Sustainable Grazing	Monitoring confirms established pasture is able to sustain grazing activities comparable to that of the surrounding remnant pasture areas.	Section 8.4	No	TBA	Ongoing operations

7.0 Rehabilitation Implementation

7.1 Status of MOP Commencement

This section describes the status of each domain at the start of this MOP period. This information is also presented graphically in **Plan 2**. The rehabilitation status of domains which are currently active (areas subject to on-going mining operations), are not described in detail.

Mine waste rock emplacements have been progressively re-shaped behind the active mining areas to construct landforms generally consistent with the pre-mining landform surface. Other Project components including areas of tailings emplacements have also been progressively rehabilitated as the area has become available.

Revegetation of completed landforms has been progressively undertaken and has included establishing both woodland and grassland vegetation communities, consistent with the rehabilitation objectives (**Section 4.3**) and post-mining land use (**Section 4.2**). As at 31 December 2017 approximately 599ha of completed landforms have been rehabilitated (**Table 28**).

Table 28 Cumulative Rehabilitation Areas

Revegetation	Final Land Use	Area (Ha)	Performance Criteria Achieved at MOP Commencement
Pasture	Grazing	539	No - ongoing
Woodland	Woodland Corridor	60	No – ongoing
Total Areas		599	

Table 29 provides a summary of the status of activities for the Primary Domains at the commencement of the MOP period. The activity status of the domains include:

- **Active:** Domains subject to on-going mining operations and associated mining activities;
- **Not Active:** Domains not subject to proposed mining operations; and
- **Maintenance*:** Domains subject to rehabilitation monitoring, ecological monitoring and rehabilitation maintenance activities.

Note: There are no domains at the commencement of this MOP term that have met their respective completion criteria. Therefore ongoing management, monitoring and maintenance activities will be ongoing during this MOP term.

Table 29 Primary Domain Mining Activity Status

Domain	Domain Status	Domain Activities
Domain 1 Mine Infrastructure Areas	Active	Table 8 provides a summary of key assets within Domain 1. The infrastructure in this domain, includes but not limited to haul roads, mine entry road, main workshop, car park, mine administration and bathhouse facilities.
Domain 2 Water Management	Active	Table 8 provides a summary of assets within Domain 2. This domain is a made up of a number of clean and dirty water dams used by the Mine for operational purposes.

Domain	Domain Status	Domain Activities
Domain 3 Tailings Emplacement	Active	This domain is a made up of active and decommissioned tailings storage facilities. At the commencement of the MOP period there were two tailing facilities in various life stages, including: <ul style="list-style-type: none"> • North East Tailings Dam (NETD) <ul style="list-style-type: none"> - Progressive capping of tailings of the NETD will commence in Q2 2018 and continue through the MOP term. • Hunter Pit Tailings Dam <ul style="list-style-type: none"> - Active at the commencement of the MOP until March 2018 when the tailings dam is scheduled to be decommissioned.
Domain 4 Waste Rock Emplacement Areas	Active	This domain is a made up of a number of out of pit and in pit waste rock emplacement areas. Progressive rehabilitation of waste emplacement areas has occurred during the mine life.
Domain 5 Subsidence Areas	Maintenance	Each relevant EP outlines the proposed management, mitigation, monitoring and reporting of potential subsidence impacts and environmental consequences from the secondary extraction of Longwalls 7 to 10a at the NWU Mine and Longwalls LW11 to LW13 and LW14 to LW16 at the SBU Mine. An EP for SBUE would be prepared prior to secondary extraction.
Domain 6 Rehabilitation (Pre MOP)	Maintenance	Revegetation of completed landforms has been progressively undertaken and has included establishing both woodland and grassland vegetation communities, consistent with the rehabilitation objectives and post-mining land use. Rehabilitation activities within this domain during the MOP term will primarily be associated with Ecosystem and Land Use Sustainability.
Domain 7 North Wambo Creek Diversion	Maintenance	Revegetation of completed landforms has been progressively undertaken and has included establishing both woodland and grassland vegetation communities, consistent with the rehabilitation objectives and post-mining land use. Rehabilitation activities within this domain during the MOP term will primarily be associated with Ecosystem and Land Use Sustainability.
Domain 8 Active Mining Area	Active	At the commencement of the MOP active mining in the open cut was undertaken as described in Section 2.3.3 . The Open Cut mine has been divided into a number of pits. These pits comprise the Bates South Pit, Bates South Extended, Montrose West Pit and Montrose East Pit
Domain 9 Future Mining	Active	This domain is made up from a number of proposed mining areas that have not commenced at the beginning of the MOP term.
Domain 10 Coal Handling and Preparation Plant	Active	This domain contains the CHPP, rail load out facility, surface conveyors, product stockpile, ROM stockpiles, ROM crusher, reject bin, workshop, offices, bathhouse and employee car park.

7.2 Proposed Rehabilitation Activities this MOP Period

Mining and progressive rehabilitation activities over the term of this MOP are shown in **Plans 3A – 3C**. A description of proposed rehabilitation activities for each domain is provided in **Sections 7.2.1 to 7.2.10**. Final landform shaping of overburden emplacement areas will be progressively completed during the MOP term and rehabilitated.

As outlined in **Section 2.3.4**, reshaping results in a stable landform incorporating slopes and drainage which blend in with the surrounding natural topography. Slope stability is integral to rehabilitation design and the objective during rehabilitation planning is to design all slopes to a gradient of 10° or less (1V:5.7H). Slopes steeper than 10° may be necessary in some locations to ensure rehabilitation merges seamlessly with adjacent undisturbed land.

Mine waste rock emplacements would cover an area of approximately 1,300 ha and be rehabilitated to a final landform up to 160m AHD. Where long slopes are present, contour drains or deep staggered rips would be established. Waste rock emplacements will be constructed in 15 to 20 metre lifts and shaped to the final landform profile when completed.

Following shaping of the landform the mine waste rock emplacements would be covered with approximately 100 mm of topsoil sourced from soil stockpiles or freshly stripped open cut mining areas. Site preparation works following the placement of topsoil would include chisel ploughing or deep ripping along contour, depending on the vegetation type to be established.

Mine waste rock emplacements would be progressively revegetated with a pasture cover crop and endemic woodland shrubs and trees planted on ridgelines and other selected areas, consistent with the proposed revegetation strategy as described in **Section 3.3.7**.

Table 30 summarises the disturbance areas and where rehabilitation activities during the MOP period will be undertaken.

Revegetation will be progressive, commencing soon after the completion of landform shaping. Species to be planted in the rehabilitated landforms will be a mixture of native and introduced locally successful tree, native and exotic grasses and legume species. Locally collected tree and shrub seed will be used where practical.

Table 16 provides the list of species to be used in revegetation of woodland corridor areas. **Table 16** and **Table 17** provide the list of species to be used in revegetation pasture/woodland areas. Areas nominated for temporary rehabilitation, will use species as identified in **Table 17**.

In previously rehabilitated areas, ongoing maintenance activities will include controlling weeds and pests, repairing landforms, re-seeding and application of maintenance fertilisers as required. The requirement of these activities will be based on the annual rehabilitation monitoring program (**Section 8.0**) and opportunistic inspections of rehabilitated areas.

In RWEP areas, ongoing activities will include controlling weeds and animal pests as required. The requirement of these activities will be based on the annual monitoring program, opportunistic inspections (**Section 8.0**) and as required by the BMP.

Table 30 Rehabilitation and Disturbance Progression during the term of the MOP

Year	Total Disturbances (ha)	Total Rehabilitation (ha)	Cumulative Rehabilitation (ha)
2018	82.1	58.1	657.1
2019	21.2	44.3	701.4
2020	23.5	42.4	743.8
At end of MOP	126.8	144.8	743.8

Sections 7.2.1 to 7.2.16 provide a summary of rehabilitation activities scheduled for each domain during the MOP term, including the appropriate rehabilitation phase to be undertaken, with respect to the following rehabilitation activities, including:

- Timing and activities involved in decommissioning;
- Physical and chemical characteristics of mining and process waste of emplaced material relevant to rehabilitation;
- Method of landform establishment;
- Final landform profile and slopes;
- Characteristics of all cover material including sealing/drainage layers, subsoil/topsoil;
- Thicknesses of cover layers and methods of laying and compaction including topsoil, imported substrate material;
- Drainage and erosion control methods;
- Soil amelioration/treatment methods;
- Vegetation species and establishment techniques;
- Management of cleared vegetation;
- Habitat establishment techniques; and
- Maintenance activities/requirements.

7.2.1 Domain 1 – Mine Infrastructure Areas

No rehabilitation activities are scheduled for this domain during the MOP term. **Plan 3C** illustrates the infrastructure areas that will be remaining at the end of the MOP term.

This domain will remain active during the MOP term. At mine closure the infrastructure in this domain that is not required as part of a post closure land use will be decommission and removed. Interim rehabilitation measures, including the establishment of cover crops and dust management controls on incomplete landforms and other inactive disturbance areas, will be implemented where they may remain inactive for an extended period. These measures will provide initial stabilisation of mine landforms, reduce the visual impact of the mine and minimise the potential for generation of windblown dust and sediment laden runoff during decommission activities. Temporary rehabilitation using pasture species as provided in **Table 17** will be used to stabilise these areas.

7.2.2 Domain 2 – Water Management

No rehabilitation activities are scheduled for this domain during the MOP term. **Plan 3C** illustrates the water management dams that will be remaining at the end of the MOP term.

This domain will remain active during the MOP term. At mine closure selected dams may be retained and transferred to regional landholders for use following mine closure, where agreed in consultation with relevant authorities and local landholders.

7.2.3 Domain 3 – Tailings Emplacement Areas

Rehabilitation activities, including decommissioning and consolidating are scheduled for this domain during the MOP term. **Plan 3C** illustrates the tailings emplacement areas that will be remaining at the end of the MOP term.

Currently there are a number of tailing facilities in various life stages at the commencement of this MOP term, including:

- North East Tailings Dam (Decommissioned and under care and maintenance until alternate capping method trial is completed);
- Hunter Pit Tailings Dam (Currently active but scheduled for decommissioning in 2018 and followed by consolidation of the tailings); and
- Homestead and In Pit Tailings Dams (Not developed. Commissioning of the In Pit Tailings Dam is scheduled for March 2018 subject to relevant approvals

The engineered capping design would consider site topography, prevailing climatic conditions and the availability of suitable fine textures material (i.e. highly weathered mine water rock) as a cover material. The capping process creates a final landform that is stable and can be rehabilitated using the same rehabilitation concepts and methods as for the mine waste rock emplacements. Final rehabilitation of the tailings emplacement areas will occur when the dams have been capped and deemed stable and suitable for rehabilitation to occur.

7.2.4 Domain 4 – Waste Rock Emplacement Areas

Portions of waste rock emplacement areas (**Plans 3A – 3C**) are scheduled for progressive rehabilitation during the MOP term. Overburden emplacement areas progressively rehabilitated during the MOP term will transfer to rehabilitated areas. The following rehabilitation phases identified within this domain during the MOP term include:

Decommissioning

No decommissioning activities required to rehabilitate overburden emplacement areas.

Material Characterisation

Material and soil characterisation will be undertaken at an appropriate scale across the site, prior to re-handling of topsoil and waste rock material.

Representative samples will be taken to characterise the nature of the soil material (e.g. sodicity, acid-generating potential, etc.) to determine the potential limitations to rehabilitation and sustainable plant growth.

The results will be used to determine specific ameliorant techniques that may be applied to the soil material in order for rehabilitation to be sustainable.

Some ameliorates may need to be added to rehabilitated areas, with these possibly including gypsum, lime, fertiliser and organic growth material (OGM). The use of soil ameliorants is designed to prevent surface crusting, increase moisture and organic content, and buffer surface temperatures to improve germination.

Landform Establishment

As outlined in **Section 2.3.4**, landform reshaping consists of re-contouring overburden dumps to the designed shape for final rehabilitation to a final landform up to 160m AHD.

Reshaping results in a stable landform incorporating slopes and drainage which blend in with the surrounding natural topography. Slope stability is integral to rehabilitation design and the objective during rehabilitation planning is to design all slopes to a gradient of 10° or less (1V:5.7H). Slopes steeper than 10° may be necessary in some locations to ensure rehabilitation merges seamlessly with adjacent undisturbed land.

Once bulk reshaping is completed, the landform is ripped to approximately 200-300 mm and then the final trim and rock raking are undertaken. The ripping loosens up any near surface strata within the landform that have been compacted during placement, aiding root penetration during vegetation establishment. The final trim smooths out any washouts, rough edges, temporary access tracks, local steep topography and prepares the surface for revegetation.

Rock-raking removes exposed surface rock greater than 200 mm in diameter. This raking is usually done along the contour, leaving a textured surface that assists with erosion minimisation until vegetation can be established.

Growth Medium Development

Topsoil stripped ahead of mining is applied to the reshaped surface in an even layer generally not less than 100 mm. Topsoil is placed using rear dump haul trucks and spread with dozers or graders. Once spread, the topsoil surface is disc or chisel cultivated to create a textured surface which assists in trapping surface runoff, provides seed entrapments and creates microclimates favourable for seed germination.

Where topsoil stockpiles are significantly weed infested, the top layer of the stockpile may require scalping before underlying material is used for topdressing.

If the pre-rehabilitation assessment determines the stockpiled material is sodic, gypsum should be applied at a standard rate of 5 - 10 t/ha, depending on material sodicity. If gypsum is required, it should be mixed in with the topsoil as part of the stripping operation (ameliorants applied to topsoil surface prior to stripping), irrespective of whether the topsoil is to be placed in storage or directly applied to a rehabilitation area. Application of ameliorants as part of the topsoil stripping process is cost effective, and – in the case of gypsum in particular - gives the ameliorants additional time to react and modify the soil to ensure it is a stable growing medium.

Although low pH soil has not historically been a concern at Wambo, a lime requirement test should be undertaken to determine the lime application rate, if low pH material is identified during the pre-rehabilitation assessment.

Addition of organic supplements is recommended for high and low pH, sodic (dispersive) and low fertility soils. Such supplements can also assist in returning favourable soil microorganisms to sterile long-stockpiled material.

Erosion and Sediment Control

The surface of mine waste rock emplacements would be constructed to form a pattern of ridges and valleys. The valley areas would be shaped into a network of constructed drainage structures. Mine waste rock emplacement surfaces would be formed to maximise rainfall absorption and to minimise the requirement for artificial drainage structures. Mine waste rock emplacement berms would generally be reverse graded with perimeter bunds constructed as necessary.

Natural slopes commonly evolve to form an 'S' shape as a result of natural erosion and deposition processes. Mine waste rock emplacement slopes would generally be constructed in profile to form an 'S' shape with the upper 20 to 30% being convex and the lower 70 to 80% being concave.

Until an adequate vegetation cover is established, heavy rainfall may cause erosion, resulting in a dissected land surface, resource loss and the need for expensive remedial treatment. Therefore, slope length is reduced by fit for purpose designed structures such as contour drains, to intercept and divert water off the slopes. The structure(s) principle aim is to drain water safely from the landform, via a sediment detention structure if the water is to be discharged from the mine water management footprint.

Ecosystem Establishment:

The revegetation strategy includes the revegetation of disturbance areas with areas of woodland (corridors), areas which contain a mixture of woodland and pasture, and riparian vegetation, as described **Section 3.3.7.4**.

Vegetation may be established by the following methods:

- Sowing or direct seeding;
- Propagules (seeds, lignotubers, corms, bulbs, rhizomes and roots) stored in the topsoil;
- Spreading harvested plants with bradysporous seed (seed retained on the plant in persistent woody capsules) onto areas being rehabilitated;
- Planting nursery-raised seedlings (tubestock); and
- Invasion from surrounding areas through vectors including birds, animals and wind.

The most common method of vegetation establishment at Wambo is broadcast seeding of selected pasture or tree seed mixes.

Seed sowing is usually supplemented by the concurrent application of granulated fertiliser. Sowing is undertaken shortly after topsoil spreading to avoid loss of topsoil due to wind and rain action. Tubestock is generally only used to establish vegetation where rapid growth or specific species establishment is required, such as remedial revegetation, erosion control or visual bunding.

Fertiliser application is beneficial to vegetation establishment to replenish any nutrient deficiencies. The type of fertiliser and application rate varies according to the specific site, soil type and post-mining use of the area. When applying any additional chemical or products to the soil, the effects of runoff and leaching will be considered, as rapid leaching from organic wastes are known to provide ideal conditions for algal blooms and exacerbate weed growth and infestation.

Timing for initial vegetation establishment is an important factor for successful revegetation. Where possible, sowing and planting are planned to occur as soon as possible prior to the expected onset of reliable rains or after a break of the season (i.e. Autumn and Spring).

Following the changes in topography, drainage and soil conditions that results from open cut mining, some local provenance species may not be suitable for revegetation and seed sourced from outside the immediate district may be required. The most appropriate species to use to rehabilitate the area are those most suited to the soil types, drainage status, aspect and climate of the site. The biodiversity values of the surrounding native vegetation communities are considered during rehabilitation planning.

Distribution of vegetation type and species selection will be designed to enhance these values, whilst ensuring that weed and fire hazards are not increased for surrounding local agricultural areas. In recognition of the importance of vegetation corridors to regional biodiversity, rehabilitation initiatives aim to increase the connectivity of vegetation in the region through the establishment of woodland corridors. Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park. In doing so, WCPL will address the issue of discontinuity in remnant vegetation across the Hunter Valley floor.

Revegetation will include the use of native species with the potential to offer habitat resources for native wildlife (e.g. breeding, roosting/nesting or foraging resources), including threatened fauna species. The revegetation program will include the use of food tree species for the Glossy Black-cockatoo (e.g. *Allocasuarina* sp.).

Ecosystem Development

At the ecosystem and land use sustainability phase, rehabilitation monitoring results would be used to confirm rehabilitation areas are on a trajectory towards a self-sustaining ecosystem and towards meeting the rehabilitation completion criteria. Monitoring results would also be used to determine the requirement for maintenance and/or contingency measures (e.g. supplementary plantings) to improve rehabilitation performance. Contingency measures are described further in **Section 8.3**.

It is expected that at this phase, the need for maintenance/intervention would be no greater than that required for the surrounding lands whether it be for grazed lands or for existing remnant vegetation areas such as the RWEF areas.

One rehabilitation objective is the establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park. Creation of post-mining landforms that enhance the amenity of the local landscape and contribute to local and regional habitat corridors as presented in the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (NSW Department of Mineral Resources, 1999).

Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park (WCPL, 2003).

Maintenance Activities

Key rehabilitation maintenance requirements include:

- Weed and feral animal control of rehabilitation;
- Erosion control works;
- Re-seeding/planting of rehabilitation areas that may have failed;
- Maintenance fertilising; and
- Repair of fence lines, access tracks and other general related land management activities.

The requirement of these rehabilitation maintenance activities will be based on the annual rehabilitation monitoring program (**Section 8.0**) and opportunistic inspections of rehabilitated areas as described in the BMP. The rehabilitation maintenance activities are described in **Section 9.0**.

7.2.5 Domain 5 – Subsidence Area

Rehabilitation activities in this domain will be in accordance with each relevant approved EP and would generally include the following.

Visual monitoring of remediated subsidence areas will be conducted monthly to identify any requirement for maintenance measures and/or remedial works.

Any installed sediment control structures will be inspected on a monthly basis, or following rainfall events of equal to or greater than 20 mm/day (midnight to midnight) as recorded by the Wambo Meteorological Station.

Details of any subsidence impacts observed will be recorded in the Subsidence Impact Register with visual observations documented in the Subsidence Impact Register. Visual inspections will be undertaken in accordance with an inspection checklist as provided in the Subsidence Monitoring Program.

Subsidence impacts (mainly surface cracking) within areas of existing pasture (Domain C) utilised for grazing and previously rehabilitated areas in the open cut (Domain 6) will be remediated. The implementation of the program to remediate these areas will be carried out in the MOP term. The results of the subsidence remediation activities will be provided in the Annual Review. Subsidence repairs on private property to be carried out in accordance with **Section 3.3.4**.

7.2.6 Domain 6 – Rehabilitation (Pre MOP)

Ecosystem Development

At the ecosystem and land use sustainability phase, rehabilitation monitoring results would be used to confirm rehabilitation areas are on a trajectory towards a self-sustaining ecosystem and towards meeting the rehabilitation completion criteria. Monitoring results would also be used to determine the requirement for maintenance and/or contingency measures (e.g. supplementary plantings) to improve rehabilitation performance. Contingency measures are described further in **Section 8.3**.

It is expected that at this phase, the need for maintenance/intervention would be no greater than that required for the surrounding lands whether it be for grazed lands or for existing remnant vegetation areas such as the RWEPP areas.

One rehabilitation objective is the establishment of woodland vegetation linking remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park. Creation of post-mining landforms that enhance the amenity of the local landscape and contribute to local and regional habitat corridors as presented in the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (NSW Department of Mineral Resources, 1999).

Accordingly, the rehabilitation program has been designed to establish linkages between the rehabilitation areas, existing remnant vegetation and Wollemi National Park (WCPL, 2003).

Maintenance Activities

Key rehabilitation maintenance requirements include:

- Weed and feral animal control of rehabilitation;
- Erosion control works;
- Re-seeding/planting of rehabilitation areas that may have failed;
- Maintenance fertilising; and
- Repair of fence lines, access tracks and other general related land management activities.

The requirement of these rehabilitation maintenance activities will be based on the annual rehabilitation monitoring program (**Section 8.0**) and opportunistic inspections of rehabilitated areas as described in the BMP. The rehabilitation maintenance activities are described in **Section 9.0**.

7.2.7 Domain 7 – North Wambo Creek Diversion

A section of the North Wambo Creek has been diverted to avoid the Wambo Open Cut Mine. The North Wambo Creek diversion was constructed in accordance with the approved North Wambo Creek Diversion Plan.

Rehabilitation activities within this domain during the MOP term will primarily be associated with Ecosystem and Land Use Sustainability phase, including the following rehabilitation maintenance activities:

- Controlling weeds;
- Repairing landforms and the creek channel (as a result of mine induce subsidence);
- Revegetation (i.e. replanting and/or reseeded); and
- Application of maintenance fertilisers as required.

A selection of pasture/cover crops have been utilised in the revegetation of the North Wambo Creek diversion riparian zone. The revegetation strategy includes the planting of the riparian corridor with River Oak (*Casuarina cunninghamia*) and Rough-barked Apple (*Angophora floribunda*).

The requirement of these rehabilitation maintenance activities will be based on the annual rehabilitation monitoring program (**Section 8.0**) and opportunistic inspections of rehabilitated areas as described in the BMP. The rehabilitation maintenance activities are described in **Section 9.0**.

7.2.8 Domain 8 – Active Mining Areas

No rehabilitation activities are scheduled for this domain during the MOP term. Some areas of the active mining area will transfer to overburden emplacement areas during the MOP term as identified on **Plans 3A – 3C**.

7.2.9 Domain 9 – Future Mining Areas

No rehabilitation activities are scheduled for this domain during the MOP term, however some areas of the future mining area will transfer to active mining areas during the MOP term as identified on **Plans 3A – 3C**.

Surface Disturbance Permit Procedure

WCPL has implemented a Surface Disturbance Permit (SDP) procedure and checklist. The SDP requires the approval of WCPL's Environmental Department prior to any land disturbance and clearing activities taking place. The SDP aims to identify any environmental issues such as cultural heritage sites, flora and fauna communities, threatened species, surface drainage and the identification of any seed or timber resources that can be salvaged.

Where required, the following requirements must be addressed by the SDP prior to WCPL Environment and Community Manager granting approval:

- A plan with proposed area for disturbance delineated;
- Pre clearance surveys completed for both ecological and heritage assessments;
- An erosion and sediment control plan;
- Topsoil management measures;

- Noise management measures;
- Dust management measures; and
- Light management measures.

Salvage and Re-use of Materials

Where practicable, clearing operations will be managed to maximise the re-use of cleared vegetative material. Any seed or timber resources that can be salvaged will be identified as part of the SDP procedure. Unsuitable vegetative material will be mulched and stockpiled.

Cleared vegetation suitable for fence posts and habitat for fauna will be set aside and salvaged. Habitat features such as logs and hollows collected during a clearance campaign may be utilised in WCPL's existing rehabilitated areas or to augment habitat features for fauna in the RWEP areas.

Topsoil Stockpile Management

Where possible, direct placement of excavated topsoil onto re-shaped areas is preferred to stockpiling, in order to avoid rehandling and reduce the potential for further topsoil degradation or loss. If a re-shaped surface is not available, topsoil will stockpiled in accordance with **Section 3.3.6**.

Ideally topsoil will be stockpiled for no more than 12 months. Where practicable, the topsoil that has been stockpiled for the longest period of time will be used first on available rehabilitation areas.

The location for topsoil stockpiles will determined in consideration of where the soil is to be used for rehabilitation, the haul length and the fleet required in order to minimise rehandling of the topsoil as much as possible prior to it being used for rehabilitation.

Topsoil stockpiles will be stabilised to reduce their susceptibility to wind erosion and constructed to avoid drainage lines. Stockpiles will also be sited as far as possible from mining activities to reduce any further potential for degradation. The stockpile will be shaped/rounded and seeded to reduce the potential for erosion. The seed mix used would be consistent with the pasture species mix used for rehabilitation of pasture areas (**Section 3.3.7**)

Prior to the placement of topsoil, the ground surface will be levelled and cleared. Stockpiles will be limited to approximate heights of 3m to minimise the potential for compaction and will be constructed to be free draining.

Once constructed, the topsoil stockpiles will be signposted to minimise the potential for disturbance. Access barriers will also be constructed if necessary.

Once constructed, stockpiles will be surveyed and their location and volumes recorded in a Topsoil Stockpile Register along with other relevant data pertaining to each stockpile. On a quarterly basis, stockpiles will be assessed for erosion, vegetation coverage and weed infestation.

If weed infestations are significant, appropriate maintenance/control measures will be undertaken (e.g. spraying or manual removal).

Sampling of soil stockpiles and laboratory analysis of the samples may also be undertaken to determine the requirement for or rate of ameliorant required to improve the condition of stockpiled soils.

The Topsoil Stockpile Register (and site soil balance) will be revised/updated as soon as practicable following the replacement of soil on an available rehabilitation area and the register reviewed annually to track soil availability and soil demand.

7.2.10 Domain 10 – Coal Handling and Preparation Plant

No rehabilitation activities are scheduled for this domain during the MOP term. No rehabilitation activities are scheduled for this domain during the MOP term. **Plan 3C** illustrates the infrastructure areas that will be remaining at the end of the MOP term.

This domain will remain active during the MOP term. At mine closure the infrastructure in this domain that is not required as part of a post closure land use will be decommission and removed. Interim rehabilitation measures, including the establishment of cover crops and dust management controls on incomplete landforms and other inactive disturbance areas, will be implemented where they may remain inactive for an extended period. These measures will provide initial stabilisation of mine landforms, reduce the visual impact of the mine and minimise the potential for generation of windblown dust and sediment laden runoff during decommission activities. Temporary rehabilitation using pasture species as provided in **Table 17** will be used to stabilise these areas.

7.3 Summary of Rehabilitation Areas During the MOP

Table 31 outlines the proposed rehabilitation activities within primary and secondary domains during the MOP term. Shaded cells indicate rehabilitation phases are not applicable during the MOP term as the domains will remain Active.

Table 31 Summary of Rehabilitation Proposed during the MOP Period

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area (ha) at start of MOP	Area (ha) at end of MOP
Mine Infrastructure Area (Domain 1)	Rehabilitation (Mixed Pasture/Woodland)	1D Ref: Plan 2	Active	272	247
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
			Relinquished Lands	0	0
Water Management (Domain 2)	Water Management	2A Ref: Plan 2	Active	70	89
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
			Relinquished Lands	0	0
Tailings Emplacement Areas (Domain 3)	Rehabilitation (Mixed Pasture/Woodland)	3D Ref: Plan 2	Active	59	78
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
			Relinquished Lands	0	0
Waste Rock Emplacement Area (Domain 4)	Rehabilitation (Mixed Pasture/Woodland)	4D/4E Ref: Plan 2	Active	686	709
			Decommissioning	0	0
			Landform Establishment	0	0
	Rehabilitation (Woodland Corridors)		Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
				0	0

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area (ha) at start of MOP	Area (ha) at end of MOP
			Relinquished Lands	0	0
Subsidence Area (Domain 5)	Existing Native	5B/5E Ref: Plan 2	Active	198	485
			Decommissioning	0	0
	Existing Pasture		Landform Establishment	0	0
	Growth Medium Development		0	0	
	Ecosystem Establishment		1324	1325	
	Ecosystem Development		As required		
	Relinquished Lands		0	0	
Rehabilitation Area (Domain 6)	Existing Pasture Rehabilitation (Mixed Pasture/Woodland)	6C/6D Ref: Plan 2	Active	521	666
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	521	666
			Relinquished Lands	0	0
North Wambo Creek Diversion (Domain 7)	Rehabilitation (Pasture and selected woodland species)	7D Ref: Plan 2	Active	90.0	90.0
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	90.0	90.0
			Relinquished Lands	0	0
Active Mining Area (Domain 8)	Rehabilitation (Mixed Pasture/Woodland)	4D/4E/8F Ref: Plan 2	Active	48	23
			Decommissioning	0	0
			Landform Establishment	0	0
	Rehabilitation (Woodland Corridors)		Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
	Final Void		Relinquished Lands	0	0
Future Mining (Domain 9)	Rehabilitation (Mixed Pasture/Woodland)	9D/9E Ref: Plan 2	Active	334	0
			Decommissioning	0	0
			Landform Establishment	0	0
	Rehabilitation (Woodland Corridors)		Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
			Relinquished Lands	0	0
Coal Handling And Preparation Plant (Domain 10)	Rehabilitation (Mixed Pasture/Woodland)	10D/10E 10G Ref: Plan 2	Active	28	28
			Decommissioning	0	0
			Landform Establishment	0	0
	Rehabilitation (Woodland Corridors)		Growth Medium Development	0	0
			Ecosystem Establishment	0	0
			Ecosystem Development	0	0
			Mine Infrastructure Decommissioned	Relinquished Lands	0

Note: The mining process at WCPL does not provide for areas of landform establishment at the year end or at the end of the MOP term. However, the mining process continually transitions from active mining, overburden emplacement, landform establishment, to growth medium establishment through the year.

7.4 Relinquishment Phase Achieved during MOP Period

As mining activities at WCPL are scheduled to continue past the MOP period and the Mine has an approved 35 year mine life until the year 2039, there will be no areas subject for lease relinquishment at the end of this MOP term.

8.0 Rehabilitation Monitoring and Research

8.1 Rehabilitation Monitoring

Rehabilitation performance, in accordance with the BMP, is currently monitored to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures. The BMP was issued to the DP&E on the 28 October 2016 after extensive consultation with NSW Office of Environment and Heritage (OEH) and the Department of the Environment and Energy (DoEE). On the 17 November 2016 the DoEE approved the BMP. On the 1 November 2016 the OEH endorsed the BMP. Although the BMP did not receive final approval by the DP&E until 11 October 2017, key elements of the BMP applicable to this MOP including completion criteria, biodiversity management and monitoring programs have been implemented since late 2016.

The two main components of the Biodiversity Monitoring Programme include:

- Monitoring of mine rehabilitation areas; and
- Monitoring of the RWEPP areas.

8.2 Monitoring of Rehabilitation & RWEPP Areas

8.2.1 Monitoring Methodologies

8.2.1.1 Landscape Function Analysis

The LFA component of the WCPL monitoring program focuses on monitoring and providing quantitative assessment of the success of newly rehabilitated landscape establishment. Two separate assessments consisting of a varieties of measured site attributes make contribute to LFA as provided in Tongway and Hindley (2004), these are:

- Landscape Organisation Index (LOI); and
- Soil Surface Assessment.

Landscape Organisation Index is the initial LFA data acquisition step and collects information at the hill slope scale. It relates to the proportion of the transect occupied by patches of landscape elements that are relatively permanent and provide stable, resource accumulating structures, such as grassy tussocks and other ground cover, leaf litter and logs. LOI can vary from 0.0 (a totally bare site) to 1.0 (a site totally covered by vegetation).

Soil Surface Assessment results provide an index on stability, infiltration and nutrient cycling for all patch and inter-patch types for the whole of landscape (transect). The combined score from each patch type provides a stability, infiltration and nutrient cycling index.

Eleven Soil Surface Condition Indicators (SSCIs) (**Table 32**), each focusing on specific biological and/or physical processes, are used to develop three LFA indices: Stability Index (SI), Soil Infiltration (INFI) and Nutrient Cycling (NI).

Table 32: Soil Surface Condition Indicators

SSCI	Description	Relevant LFA Index		
		SI	INFI	NI
Soil Cover	Percentage cover of perennial vegetation to a height of 0.5 m. plus rocks > 2 cm and woody material > 1 cm in diameter or other long-lived, immovable objects.	X		
Perennial Vegetation Cover	Percentage perennial vegetation cover.		X	X
Litter Cover	Percentage cover of annual grasses and ephemeral herbage (both standing and detached) as well as detached leaves, stems, twigs, fruit, dung, etc.	X	X	X
Cryptogam Cover	Percentage cover of algae, fungi, lichens, mosses, liverworts and fruiting bodies of mycorrhizas.	X		X
Crust Brokenness	Categorises soil crusts from 0-4 where 0 refers to 'no crust present' and 4 refers to an 'intact and smooth' soil crust.	X		
Erosion Type and Severity	Categorises the aerial extent and severity of various erosion types from 'Insignificant' to 'Severe'.	X		
Deposited Materials	Categorises the extent and depth of deposited alluvial material.			
Surface Roughness	Categorises the depth of surface depressions from 'smooth' to 'deep depressions'.	X	X	X
Surface Resistance to Disturbance	Categorises the soils capacity to resist disturbance based on the soils 'hardness' or 'brittleness'.	X	X	
Slake Test	Categorises the soils stability when exposed to water.		X	
Soil Texture	Categorises the soils water infiltration capacity from 'very slow' to 'high'.		X	

8.2.1.2 Biometric Vegetation Assessment

The BioMetric method (Gibbons et al 2009) is proposed as the model for determining meaningful, quantitative, biodiversity focused Completion Criteria. BioMetric, a NSW Government endorsed biodiversity assessment method (developed for the NSW BioBanking Assessment Methodology), provides a useful decision making framework founded on a standardised repeatable measurement method readily applicable to a monitoring program.

Management measures can be performance tested through the BioMetric process, thereby providing an appropriate evidence-based mechanism for optimising future management decisions. Evidence-based adjustments made to a predefined management regime are central to maximising the likelihood of a successful outcome.

BioMetric is a quantitative method developed to comparatively assess the condition of vegetation and habitat values of native vegetation against pre-defined benchmarks (i.e. pre European settlement). Vegetation and habitat condition is quantitatively evaluated by ten readily measurable 'site attributes' considered to reflect the relative health or level of disturbance of a specific vegetation class. These site attributes when measured against relative performance criteria provide meaningful ecological information used to inform management decisions. Site attributes measured in a BioMetric assessment are listed in **Table 33**.

Table 33: Biometric Site Attributes and Measurement Parameters

Site Attribute	Measurement parameter
Native Plant Species Richness (NPS)	Number of native plant Species within 400 m2 plot (count)
Native Over-storey Cover (NOS)	Projected foliage cover above 10 m height along a 50 m transect (%) – measured every 5 m
Native Mid-storey Cover (NMS)	Projected foliage cover between 1 and 10 m height along a 50 m transect (%) – measured every 5 m
Native Ground Cover (grasses) (NGCG)	Cover below 1 m along a 50 m transect (%) – measured every metre
Native Ground Cover (shrubs) (NGCS)	Cover below 1 m along a 50 m transect (%) – measured every metre
Native Ground Cover (other) (NGCO)	Cover below 1 m along a 50 m transect (%) – measured every metre
Exotic Plant Cover (EPC)	Cover along a 50 m transect (%) – measured every metre
Over-storey Regeneration (OR) within vegetation zone	Overstorey canopy species <5 cm diameter at breast height (DBH) within a 1,000 m2 plot (score 0 to 1)
Number Of Trees With Hollows (HBT)	Number of trees containing hollows within a 1,000 m2 plot (count)
Total Length of Fallen Logs (FL)	Log length touching ground >10 cm diameter and >0.5 m in length within a 1,000 m2 plot (metres)

8.2.2 Monitoring Program

A summary of WCPL's Biodiversity Monitoring Program is provided in **Table 34**. Monitoring locations are shown on **Figures 8 and 9**. Details on the monitoring program requirements and timing are provided in the following sections.

Table 34: Biodiversity Monitoring Program

Monitoring Type	Area	Site	Monitoring Frequency and Timing	Details
Biometric	RWEA A	V1-B1, V1-B2, V1-B3, V2-B1, V2-B2, V3-B1, V5-B1, V5-B2, V5-B3, V6-B1, V6-B2, V6-B3	Annually (Spring)	A number of permanent flora survey quadrats have been established in RWEA areas to obtain quantitative data on plant species diversity and abundance. Quadrat data will be collected at each of the floristic quadrat monitoring sites. Note: Biometric monitoring in the Woodland Rehabilitation Areas will be undertaken at the same time as the LFA monitoring in the Woodland Rehabilitation Areas.
	RWEA B	V9-B1, V9-B2, V10-B1, V13-B1, V14-B1, V14-B2		
	RWEA C	V6-A1c, V6-B1c, V6-B2c, V11-B1, V11-B2		
	RWEA D	V10-A1, V10-B3		
	Rail Loop	V5-B4, V6-B4		
	Reference Sites	V1-A1, V1-A2, V2-A1, V6-A3, V9-A1, V10-A2, V14-A1		
	Woodland Rehabilitation	3R, 4R, 6R & 8R		
LFA	Woodland Rehabilitation	3R, 4R, 6R & 8R	Annually (Autumn or Spring)	LFA consists of a number of permanent transects being established in areas of revegetation, along with corresponding transects in adjacent undisturbed areas to provide reference/ analogue sites. LFA transects are monitored annually either in autumn or spring following the commencement of revegetation.

Figure 8 Floristic Monitoring Sites

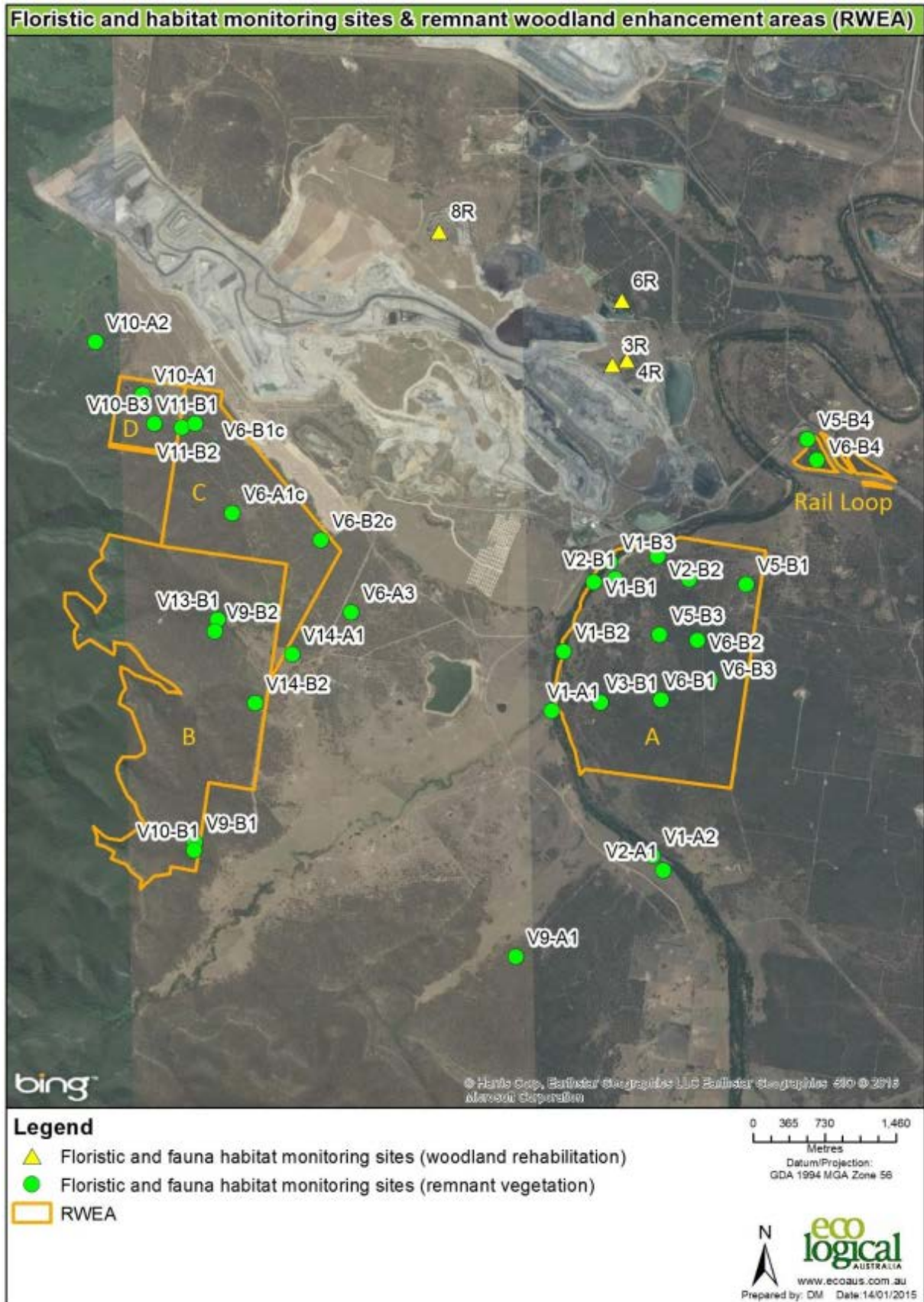


Figure 9 LFA Monitoring Sites



8.2.3 Visual Monitoring

Visual monitoring of revegetation will be undertaken to ensure vegetation is establishing and to determine the need for any maintenance and/or contingency measures (such as the requirement for supplementary plantings, erosion control and weed and animal pest control). Visual assessments allow for the rapid application of remedial actions where necessary.

8.2.4 Mine Closure Monitoring

WCPL are revising the conceptual Mine Closure Plan (CMCP) to undertake life of mine closure planning for mining operations, although the Mine is not planned for closure until 2039. The revision of the CMCP in 2018 will incorporate a review of the constraints and opportunities to identify potential sustainable land-use options, in consultation with relevant stakeholders in order to obtain feedback of any issues that need to be considered as part of the final land use analysis. The revised CMCP will be submitted to the DRG and other relevant stakeholders for approval by the end of 2018.

The CMCP will outline the mine closure goals for Wambo and describe the proposed mine closure concepts and proposed decommissioning management measures. As required by Condition 94, Schedule 4 of the Development Consent (DA 305-7-2003), the CMCP will include measures to minimise the adverse socio-economic effects associated with mine closure.

Mine closure concepts and management measures will be developed in consultation with the DRG and other relevant regulatory agencies.

At mine closure, the existing environmental monitoring program will be maintained until all decommissioning and rehabilitation works have been completed in accordance with the relevant rehabilitation criteria and objectives. In consultation with regulatory authorities, there may be the need to remove redundant and/or establish additional monitoring sites to complement existing programs at mine closure, for example establishing water quality monitoring sites at final void locations.

Capped tailings dams will be monitored during the life of the Mine and post mining to determine the success of the capping and rehabilitation process.

Approaching mine closure, contaminated assessments will be carried out to identify areas of potential contamination and develop appropriate remedial measures and monitoring requirements as the mine transfers into the closure phase.

The post closure monitoring and measurement program will be similar to that undertaken during the active mining operation, however the monitoring program may be prioritised to focus on potential environmental aspects that are likely to cause pollution and/or verify the success or failure of the rehabilitated post mining landforms.

Post closure monitoring will be conducted for up to five years after decommissioning and final rehabilitation has been completed, or until such time as monitoring records demonstrate that the site is no longer contributing, nor has the potential to contribute, pollutants to the surrounding environment, and that rehabilitation has achieved in accordance with the relevant rehabilitation criteria. Monitoring and reporting of biodiversity areas post mine closure will continue in accordance with the requirements of the BMP.

8.3 Research and Rehabilitation Trials and Use of Analogue Sites

A number of rehabilitation trials and studies have been conducted at WCPL to date and include:

- Capping studies on the North East Tailings Dam to identify a safe and viable method of capping the tailings dam surface;
- Large scale biosolid application trials to improve soil structure and effectiveness of the soil as plant growth medium (**Plate 1**);

- Trialling the application of tree mulch on the surface of rehabilitation areas to assist with dust suppression and erosion control, as well as providing a source of organic matter in the stripped topsoil;
- Incorporation of Organic Growth Medium (OGM) with topsoil material;
- A trial to assess tree establishment and development on waste rock emplacements;
- Undertake detailed soil characterisation program of waste rock emplacement areas and topsoil;
- Rationalise and improve LFA monitoring program; and
- Revise rehabilitation monitoring program to address knowledge gaps, develop appropriate quantifiable criteria and revise triggers and responses in TARP.

WCPL is committed to researching collaborative opportunities with external research institutions to partner in possible rehabilitation trials and studies conducted at WCPL to enable continued improvements in the rehabilitation practice.

Plate 1 – Biosolid Application on Re-profiled Waste Rock Emplacement



8.4 Grazing Management

WCPL have engaged a specialist agronomist to prepare a grazing management strategy to assist the Mine with a grazing capacity trial of mine rehabilitated pasture species. The grazing trial is expected to commence subject to:

- Mine rehabilitated pasture areas being made available outside mining access areas;
- Agriculture infrastructure in place including fencing and water; and
- Considered by WCPL's agronomist the proposed area of mine rehabilitated pasture is ready to carry livestock.

WCPL have identified two mine rehabilitated areas including The Backfill Project and Montrose East as potential sites for the grazing trial.

A sustainable stocking rate is one which does not degrade the natural resources or permanently reduce pasture productivity as a result of over-grazing, species loss and weed growth. The grazing trial would consider the various methods of grazing management such as rotational grazing, strategic

grazing and even cell grazing, use variations in stocking density to manage the pastures. WCPL livestock preference for the grazing trial is beef cattle.

Locally in the Hunter Valley beef cattle grazing is more common than sheep, stocking rates are often expressed as the number of livestock (head) per hectare. In an 'average' year the rehabilitated pastures on mine sites have an estimated carrying capacity of 3 dry sheep equivalent per ha. This is equivalent to 1 breeding cattle unit per 4.7 ha or 1 dry growing beast (e.g. steer) to 3.0 ha. The aim of the grazing trial will determine if WCPL's mine rehabilitated land can achieve a similar carrying capacity. The results of the grazing trial (when commenced) will be provided in the Annual Review.

9.0 Intervention and Adaptive Management

9.1 Threats to Rehabilitation

Table 35 outlines potential risks and consequences associated with rehabilitation activities. A Trigger Action Response Plan (TARP) has been developed (**Section 9.2**) to identify appropriate response measures to manage any potential rehabilitation risk.

Table 35 Rehabilitation Risks

Rehabilitation Risk	Potential Consequence/Hazard
Topsoil	Insufficient depth/volume, compromise topsoil stockpile Soil chemistry limits plant growth Loss of topsoil material from erosion
Spoil	Soils not within the preferred pH, sodicity, salinity ranges Hostile waste rock material in final landform
Surface	Insufficient depth of inert material, large rocks on surface Land contamination
Landform and Land Use	Excessive slope length, slope gradient not consistent with pre-mining topography Subsidence impacts
Vegetation	Poor establishment, excessive weeds, low species composition, mono-culture Native tree and shrub seed resource not available to complete revegetation Native pasture seed not available to complete revegetation
Erosion & sediment control	Landform not stable, failure of water management structures and ability to freely drain.
Bushfire	Risk of fire within establishing ecosystems.
Tailings Dam	Current technologies unable to provide effective capping solutions for NETD
Performance Criteria	Current rehabilitation monitoring program and available data (to date) insufficient to develop quantifiable criteria for mine closure and relinquishment

The processes outlined in this MOP will be implemented to control or eliminate these rehabilitation risks. Where necessary, rehabilitation procedures will be amended accordingly during the MOP term with the aim of continually improving rehabilitation standards.

9.2 Trigger Action Response Plan

WCPL have prepared a Trigger Action Response Plan (TARP) for rehabilitation to identify appropriate response measures in the event rehabilitation outcomes are not achieved.

Table 36 illustrates how the various rehabilitation risks, management measures and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

A revision of the TARP will be undertaken as a result of the revised rehabilitation monitoring program and capping trials proposed to allow for the development of appropriate criteria and triggers. A revised TARP will be provided in consecutive MOP amendments as soon as the data is available from the respective programs.

Table 36 Rehabilitation Trigger Action Response Plan

Ref# No.	Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
1.	Topsoil	Insufficient topsoil depths Topsoil ripping not effective	Trigger	<ul style="list-style-type: none"> Monitoring confirms average topsoil replacement at depths <100mm. Monitoring confirms topsoil has not been ripped appropriately.
			Action	<ul style="list-style-type: none"> Topsoil is to be re-applied at a minimum of 100mm. Topsoil ripped to a depth of 300mm to 500mm. Review topsoil application procedure and topsoil balance. Review topsoil stripping methods. Increase application of topsoil (and/or application with appropriate humus material) to achieve average minimum depth of 100mm.
			Responsible Persons	E&C Manager
2.	Topsoil	Loss of topsoil due to erosion, poor vegetation establishment and interaction with vehicles.	Trigger	<ul style="list-style-type: none"> Monitoring of topsoil stockpiles identifies significant erosion and loss of topsoil resource. Establishment of stabilising cover crop has failed. No signage to identify topsoil stockpiles. Evidence of unauthorised removal of material or access of topsoil material.
			Action	<ul style="list-style-type: none"> Remediate affected areas, fertilise and re-seed to stabilise as necessary. Install/repair silt fencing as required. Installation of signage. Continue to monitor. Reshape stockpile with a rough surface to reduce erosion hazard, improve drainage and promote vegetation. Re-seed and fertiliser as necessary.
			Responsible Persons	E&C Manager
3.	Topsoil	Topsoil characterisation determines soil parameters not within preferred range	Trigger	<ul style="list-style-type: none"> Topsoil characterisation confirms: <ul style="list-style-type: none"> Soil pH (H₂O) range is out side the preferred range of pH 5.5 – pH 7.8; Soil EC (H₂O) is greater than 1200 µS/cm; Soil Phosphorus: <ul style="list-style-type: none"> Colwell Method (Pasture: 20-40 mg/kg) (Native: 10-20 mg/kg) Bray Method (Pasture: 12-22 mg/kg) (Native: 6-12 mg/kg) Soil Organic Matter <3%
			Action	<ul style="list-style-type: none"> Application of appropriate soil ameliorants at rates per hectare as specified by laboratory results. Undertake further investigations to determine potential factors contributing to conditions. Consider removing unsuitable material and replace with suitable material and retest to determine soil within preferred ranges.

Ref# No.	Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
			Responsible Persons	E&C Manager
4.	Waste rock	Waste rock characterisation determines soil parameters not within preferred range	Trigger	<ul style="list-style-type: none"> Representative sampling of final surface material characterisation confirms: <ul style="list-style-type: none"> Soil pH (H₂O) range is out side pH 5.5 – pH 7.8; Soil EC (H₂O) is greater than 1200 µS/cm.
			Action	<ul style="list-style-type: none"> Application of appropriate soil ameliorants at rates per hectare as specified by laboratory results. Undertake further investigations to determine potential factors contributing to conditions. Consider removing unsuitable material and replace with suitable material and retest to determine soil within preferred ranges.
			Responsible Persons	E&C Manager and Open Cut Mine Manager
5.	Tailings capping layer	Insufficient inert material cover of tailings emplacement areas	Trigger	<ul style="list-style-type: none"> Monitoring confirms inert material of >2m coverage over tailings is not being achieved. Final landform slope grades are >1%. Capping layer final landform shape is not compatible with surrounding landscape.
			Action	<ul style="list-style-type: none"> Increase volume of compacted inert minimum coverage of 2m when creating final landform (or greater if required by final capping design specifications). Continue monitoring to confirm compacted inert material coverage of 2m (or greater) is being achieved. Re-profile final landform to achieve drainage grades of <1% and compatibility with surrounding landscape. Review tailings capping application procedure.
			Responsible Persons	E&C Manager, Project Capital Engineer and Open Cut Mine Manager
6.	Final landform surface	Insufficient inert material cover of coarse reject emplacements Spontaneous combustion Landform slumping Acid mine drainage (AMD) Drainage	Trigger	<ul style="list-style-type: none"> Monitoring confirms compacted inert material over coarse reject emplacement areas is not achieving minimum coverage of 2m in some areas when creating final landform. Monitoring confirms spontaneous combustion evidence. Monitoring confirms slumping has occurred in the final landform. Monitoring confirms possible AMD issues. Drainage with >3% fall are not appropriately armoured to prevent scouring.
			Action	<ul style="list-style-type: none"> Increase volume of compacted inert minimum coverage of 2m over carbonaceous material when creating final landform. Continue monitoring to confirm compacted inert material coverage of 2m is being achieved. Review inert material application procedure to ensure sufficient inert material is available to achieve the minimum coverage of 2m. Remove material with spontaneous combustion propensity, replace with inert material, compact and re-profile to final land form. Repair slumped area with additional material, compact and re-profile to final land form.

Ref# No.	Rehabilitation Risk	Consequence/Hazard	TARP Code	Contingency Responses
				<ul style="list-style-type: none"> If testing identifies AMD issues, remove potential AMD material with acid generating propensity, and replace with inert material, compact and re-profile to final land form. Seek further advice from WCPL rehabilitation specialist to design appropriate drainage structures and install /construct as required.
			Responsible Persons	E&C Manager and Open Cut Mine Manager
7	Final landform surface	Excessive slope lengths	Trigger	<ul style="list-style-type: none"> Slope lengths >80m limit at slope angles of 10⁰.
			Action	<ul style="list-style-type: none"> If possible, undertake rectification works to reduce average slope lengths to approximately 50m to 70m when slope angles of 10⁰. Seek further advice from WCPL rehabilitation specialist to: <ul style="list-style-type: none"> Review final landform design and stability performance; and Determine if additional measures are necessary to manage surface water flows to ensure slope stability can be maintained.
			Responsible Persons	E&C Manager and Open Cut Mine Manager
8		Steep slope gradients Maximum height of final landforms no greater than RL160 AHD.	Trigger	<ul style="list-style-type: none"> Final slope angle above >10⁰ and may be considered inconsistent with pre-mining topography. Final dump height survey greater than RL 160 AHD.
			Action	<ul style="list-style-type: none"> Regrade slopes to achieve <10⁰. Reduce dump height to RL 160 AHD. Resurvey to confirm correct slope angle and dump height. Seek further advice from WCPL rehabilitation specialist to review final landform design and performance if slope grades cannot be achieved; and Seek consultation with DRG if landform is at risk of not achieving pre-mining topography as identified within the EIS.
			Responsible Persons	E&C Manager and Open Cut Mine Manager
9.	Woodland rehabilitation	Low biometric vegetation scores	Trigger	<ul style="list-style-type: none"> Score obtained during annual monitoring round is less than Interim Performance Targets
	Pasture rehabilitation Riparian rehabilitation		Action	<ul style="list-style-type: none"> Check and validate the data to ensure correct/accurate. Review site attribute scores to determine which attributes are contributing to the lower than expected score Review management actions undertaken during previous 12 months (applicable to relevant management period) to determine if actions have contributed to the lower than expected score Review previous monitoring scores and climatic conditions to establish whether external factors could be contributing to the lower than expected score. Develop remedial actions to address declining biodiversity values.

Ref# No.	Rehabilitation Risk	Consequence/Hazard	TARP Code	Contingency Reponses
				<ul style="list-style-type: none"> Review LFA monitoring to examine for potential casual factors OR start LFA monitoring if landform instability is detected. Expand monitoring program to include additional treatment and reference sites.
			Responsible Persons	E&C Manager
10.		Low LFA scores	Trigger	<ul style="list-style-type: none"> <5% annual improvement or significant decline in LFA Score (from previous monitoring round)
			Action	<ul style="list-style-type: none"> Check and validate the data to ensure correct/accurate. Review individual LFA Index results to determine which index result is contributing to the lower than expected score Review management actions undertaken during previous 12 months (applicable to relevant Management Period) to determine if actions have contributed to the lower than expected score Review previous monitoring scores and climatic conditions to establish whether external factors could be contributing to the lower than expected score Develop remedial actions to address stagnant or declining landscape stability, if stagnant or declining score not caused by external factors. Maintain monitoring of affected site until first LFA score ≥ 50 (i.e. stable landform) and Review monitoring program and consider expanding to include additional treatment and reference sites.
			Responsible Persons	E&C Manager
11.		Ground cover	Trigger	<ul style="list-style-type: none"> Monitoring identifies vegetative coverage <70% and/or individual bare areas >20m² Biometric monitoring confirms exotic cover <33%.
		Exotic cover	Action	<ul style="list-style-type: none"> Review seed viability, seasonal conditions and other influences e.g. soil preparation, seed application procedures etc. Re-test soil chemistry and ameliorate as necessary. Re-seed affected areas. Maintain monitoring program for presence of weeds in accordance with the BMP. Maintain seasonal weed spraying control measures as required by BMP. Review BMP to determine if existing weed control measures are adequate. Increase monitoring frequency for presence of weeds.
			Responsible Persons	E&C Manager
12.	Water management	Pollution of downstream watercourses.	Trigger	<ul style="list-style-type: none"> Water runoff from rehabilitation areas exceeds EPL water quality limits. Water quality in the NWCD exceeds SWMP trigger values.
			Action	<ul style="list-style-type: none"> Refer to Surface and Groundwater Response Plan (for appropriate actions and responses).

Ref# No.	Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Reponses
			Responsible Persons	E&C Manager
13.	Erosion/sediment control	Unstable landforms	Trigger	<ul style="list-style-type: none"> Monitoring indicates gully and tunnel erosion present. Monitoring identifies rilling erosion approximately >200mm deep and/or >200mm wide. Groundcover is <60%. No erosion and sediment control are in place. Erosion and sediment controls in place but are no effective.
			Action	<ul style="list-style-type: none"> Undertake appropriate remediation works to address erosion. Install appropriate erosion and sedimentation controls. Maintain monitoring program to determine effectiveness of repairs. Investigate potential causes contributing to erosion. Review ESCP for adequacy. Review existing erosion controls for adequacy.
			Responsible Persons	E&C Manager
14.	Subsidence	Presenting an immediate safety, environmental hazard Presents hazard to long term final land use Creek stability and hydraulic losses.	Trigger	<ul style="list-style-type: none"> Surface cracking presents either an immediate safety, environmental hazard (e.g. an erosion hazard or hazard to grazing stock) or risk to final land use. Visual inspections have identified increased cracking, scouring and ponding in NWCD. Visual inspections have identified cracking with widths >50mm. Increased leakage into SBU mine from NWCD.
			Action	<ul style="list-style-type: none"> Repaired and rehabilitated as identified in Section 3.3.4 Carry out repairs to NWCD in accordance with Extraction Plan – South Bates(Whybrow Seam) Underground Mine Longwalls LW11 to 16 Creeks affected by subsidence have been repaired and their functionality and stability has been confirmed by a hydrological engineer (or equivalent).
			Responsible Persons	E&C Manager and Project Capital Engineer
15.	Decommissioning	Decommissioning activities is not consistent with Conceptual Mine Closure Plan (CMCP).	Trigger	<ul style="list-style-type: none"> Removal of all redundant services, infrastructure, carbonaceous material, wastes hazardous materials, sealing of mine and ventilation shafts etc. post mine closures has not been completed as required by the CMCP. Identification of possible contaminants at mine closures and either removal or treatment has not be carried out as required by the CMP. Dewatering and removal of possible contaminants from selected mine water dams post mine closure has not been carried out as required by CMCP. Decommissioning activities of tailings emplacement areas has not been carried out as required by the CMCP. The site at post mine closures presents an immediate risk to the environment and public safety.

Ref# No.	Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
			Action	<ul style="list-style-type: none"> Undertake a review of the closure strategies to ensure the site at post closure does not present an immediate risk to the environment and public safety. Complete all mine closure activities as required by the CMCP Review CMCP for adequacy Seek consultation with the DRG if changes to the CMCP are required.
			Responsible Persons	E&C Manager and Project Capital Engineer
16.	Final Voids		Trigger	Triggers to be revised in accordance with revised Final Void Management Plan (FVMP).
			Action	Actions to be revised in accordance with FVMP
			Responsible Persons	E&C Manager
17.	Terrestrial fauna	Native species diversity	Trigger	<ul style="list-style-type: none"> Fauna monitoring identifies a trend of low native species diversity inhabiting rehabilitated woodland areas. Fauna monitoring identifies high number of feral animals present within rehabilitation areas.
		Feral animals	Action	<ul style="list-style-type: none"> Review biometric scores as identified in TARP Ref. 9 to consider if management actions consider improving biodiversity outcomes. Seek ecologist advice on improving biodiversity outcomes in rehabilitation areas. Consider further habitat augmentation with hollow logs etc. to improve biodiversity outcomes. Review feral animal controls in the BMP. Continue monitoring as required by BMP
			Responsible Persons	E&C Manager
18.	Bushfire	Fire	Trigger	<ul style="list-style-type: none"> Bushfire outbreak in rehabilitation areas.
			Action	<ul style="list-style-type: none"> Review Bushfire Management Plan. Implement actions as required by Bushfire Management Plan. Review affected areas to determine bushfire resilience of species. Seek ecologist advice and monitor for plant rejuvenation Re-plant, re-seed affected areas if no plant rejuvenation is evidence (on the advice of ecological specialist). Monitor re-plantings/seeded areas as required by BMP.
			Responsible Persons	E&C Manager

10.0 Reporting & Review

10.1 Reporting

WCPL is required to prepare and submit an Annual Review, formally known as Annual Environmental Management Report (AEMR), as required under Development Consent DA305-7-2003. The Annual Review also satisfies the *AEMR Guidelines for MOPs Prepared to EDG03 Requirements*.

The Annual Review provides an annual review of monitoring results, performance measures/criteria, relevant predictions in the EAs/EIS, identifies non-compliances and corrective actions, provides rehabilitation progress and disturbance area report, rehabilitated areas and areas undergoing rehabilitation to demonstrate that progressive rehabilitation objectives are being achieved.

The Annual Review also satisfies the reporting requirements for Environment Protection Licence (EPL). **Table 37** provides a summary of the reporting mechanisms applicable to the WCPL, including which stakeholders will receive copies of each report and distribution.

Table 37 Reporting Framework

Report	Frequency	Distribution	Responsibility for Report Preparation
Incident Report	Provide detailed report within 7 days on notification	<ul style="list-style-type: none"> • DP&E (Manager, Mining Projects) • DRG (Director – Environmental Sustainability) • OEH/EPA (General Contact) 	Environment and Community Manager
Annual Review	Annually (end of March each year)	<ul style="list-style-type: none"> • DP&E (Manager, Mining Projects) • DRG (Director – Environmental Sustainability) • OEH/EPA (General Contact) • CLWD (Mines Assessment and Planning) • Singleton Shire Council (General Manager) • CCC Members • Online via the Peabody website 	Environment and Community Manager

10.2 Review & Implementation

Reviews of the MOP will be undertaken by Environment and Community Manager and Technical Services Manager as required during the MOP term to assess the effectiveness of the procedures against the objectives of MOP. The MOP may also be reviewed, and if necessary amended, for example, to incorporate modifications of DA305-7-2003 and any proposed activities that are not in accordance with the MOP. The MOP may also be reviewed and revised due to changes in environmental requirements, risk assessments, monitoring results, completion criteria, technologies and legislation. Any proposed amendment to the MOP would be completed in accordance with the MOP Guidelines and in consultation with the DRG and other relevant stakeholders.

The General Manager and each respective Mine Manager will ensure appropriate resources are provided to implement the MOP. The implementation of this MOP will be the responsibility of the Environment and Community Manager and Technical Services Manager.

11.0 Rehabilitation Plans (A3)

12.0 References

Australian and New Zealand Minerals and Energy Council and Mineral Resources Council of Australia (2000) *Strategic Framework for Mine Closure*.

Department of Mineral Resources (1999) *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales*.

Department of Mineral Resources (2003) *Guideline for Applications for Subsidence Management Plan Approvals*.

Department of Trade and Investment, regional Infrastructure and Services – Mine Safety Operations (2012) *Mine Design Guideline 6001 Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams*.

Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy (2013) *ESG3: Mining Operations Plan (MOP) Guidelines*.

Global Soil Systems (2009) *Rehabilitation Standards for Wambo Coal Pty Limited*.

Wambo Coal Pty Limited (2003) *Wambo Development Project Environmental Impact Statement*.

Wambo Coal Pty Limited (2007) *Topsoil Stockpile Management Procedure*.

Wambo Coal Pty Limited (2009) *Restoration Procedure*.

Wambo Coal Pty Limited (2013) *North Wambo Creek Diversion Plan*.

Wambo Coal Pty Limited (2017) *Biodiversity Management Plan*.

Wambo Coal Pty Limited (2014b) *Extraction Plan for North Wambo Underground Mine Longwalls 7 to 10*.

Wambo Coal Pty Limited (2014b) *Extraction Plan for North Wambo Underground Mine Longwalls 7 to 10a*.

Secondary Flocculation Capping Assessment for Wambo Tailings Storages (May 2017), Fitton Tailings Consultants Pty Ltd.

13.0 Abbreviations

BMP	Biodiversity Management Plan
BMgtP	Blasting Management Plan
CCC	Community Consultative Committee
CCL	Consolidated Coal Lease
CL	Coal Lease
CLWD	Crown Lands and Water Division, Department of Industry
DMR	NSW Department of Mineral Resources (now DRG)
DP&E	NSW Department of Planning & Environment
DPI	NSW Department of Primary Industries
DRG	Division of Resources and Geoscience
DSC	NSW Dams Safety Committee
EEC	Endangered ecological community
Project EIS	<i>Wambo Coal Project Environmental Impact Statement 2003</i>
EPA	NSW Environment Protection Authority
EP&A Act	NSW <i>Environmental Planning and Assessment Act, 1979</i>
EPL	Environment Protection Licence
FFMP	Flora and Fauna Management Plan (now BMP)
MOP	Mining Operations Plan
RMP	Rehabilitation Management Plan
RWEP	Remnant Woodland Enhancement Program
SDP	Surface Disturbance Protocol
TARP	Trigger Action Response Plan
TWMS	Total Waste Management System
VCP	Vegetation Clearance Protocol
WCPL	Wambo Coal Pty Limited

APPENDIX 1
Rehabilitation Plans

APPENDIX 2
DA305-7-2003

APPENDIX 3
Surface Disturbance Permit