



WAMBO COAL MINE REHABILITATION MANAGEMENT PLAN

Prepared by Wambo Coal Pty Ltd
Document No. WA-ENV-MP-513

Summary Table

Name of Mine:	Wambo Coal Mine
Name of Lease Holder(s):	Wambo Coal Pty Limited
Name of Mine Operator:	Wambo Coal Pty Limited
Mining Lease(s) / Lease Numbers / Expiry Dates:	CL 365 (expires 19/09/2032)
	CL 374 (expires 21/03/2026)
	CL 397 (expires 04/06/2034)
	CCL 743 (expires 14/08/2022)
	ML 1402 (expires 14/08/2022)
	ML 1572 (expires 20/12/2026)
	ML 1594 (expires 30/04/2028)
	ML 1806 (expires 11/08/2041)
Rehabilitation Management Plan Commencement Date:	1 August 2022
Rehabilitation Management Plan Revision Dates and Version Numbers:	7 October 2022 Revision 2

Revisions

Rev No	Date	Description	By	Checked
1	1 August 2022	Original	WCPL	JB
2	7 October 2022	To address a revision to the Guideline: Mine Rehabilitation Portal	WCPL	JB

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1 INTRODUCTION TO MINING PROJECT

1.1 HISTORY OF OPERATIONS

The Wambo Coal Mine (the Mine) is situated approximately 15 kilometres (km) west of Singleton, near the village of Warkworth, New South Wales (NSW) (**Figure 1**). The Mine is owned and operated by Wambo Coal Pty Ltd (WCPL), a subsidiary of Peabody Energy Australia Pty Ltd (Peabody).

A range of open cut and underground mining operations have been conducted at the Mine since operations commenced in 1969. Mining under the current Development Consent (Development Approval [DA] 305-7-2003) commenced in 2004, and permitted both open cut and underground operations and associated activities to be conducted.

In November 2014, Glencore and Peabody agreed to form a 50:50 Joint Venture to develop an open cut coal mine project that combined the extraction and exploration rights for a number of mining tenements held by United Collieries Pty Limited (United) (a subsidiary of Glencore) and WCPL. The Joint Venture proposed that United would manage the combined open cut mining operations utilising the Mine's existing infrastructure and WCPL would continue to operate its underground mining operations, the Coal Handling and Preparation Plant (CHPP) and rail loading facilities.

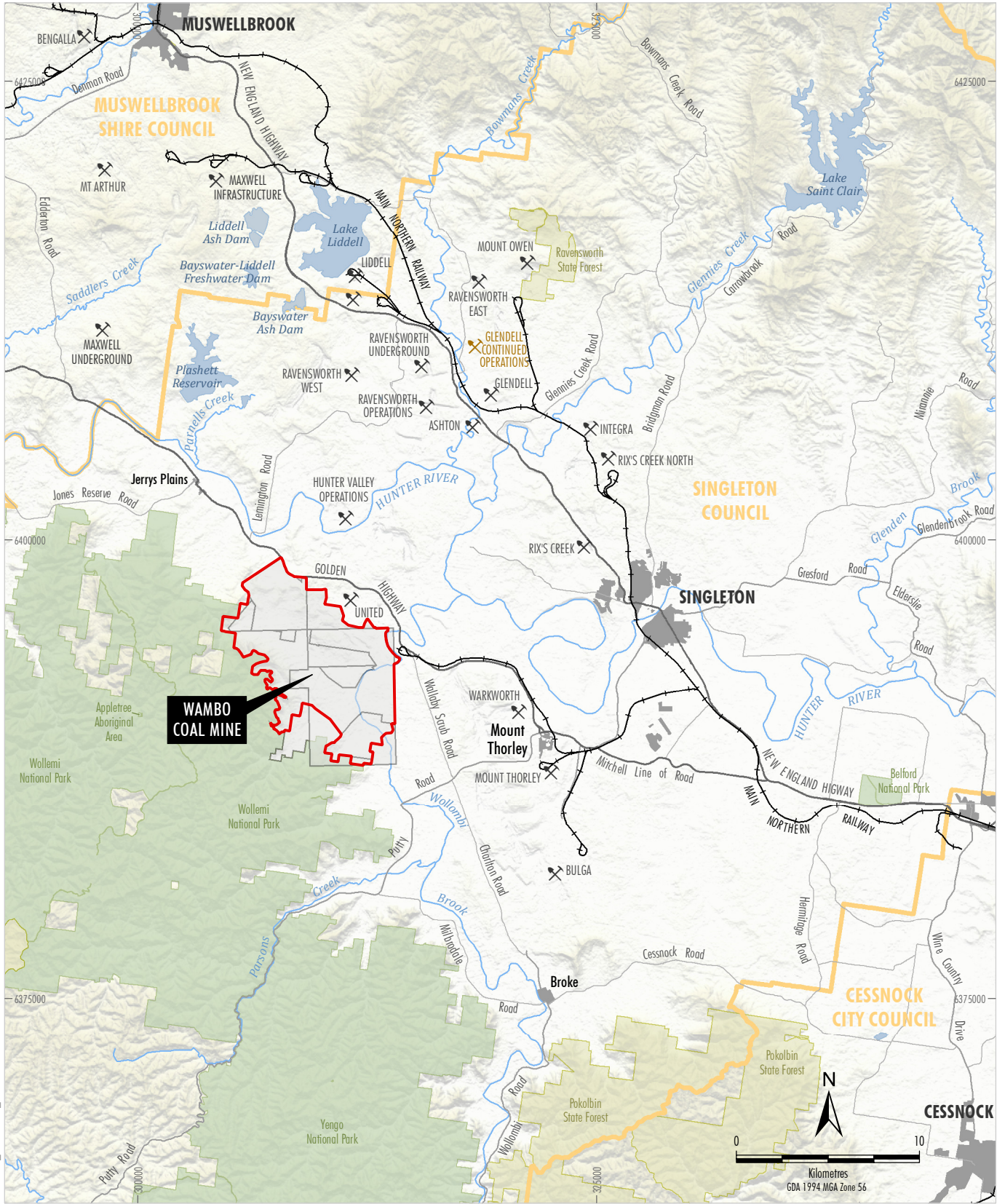
An application to modify the Development Consent (DA 305-7-2003 MOD 16) was lodged in November 2016 to support the Joint Venture and was approved by the Independent Planning Commission of NSW on 29 August 2019 and required development at the Mine to be undertaken in the following stages:

- Phase 1 – open cut mining operations at Wambo open cut mine, underground mining operations at Wambo underground mine and the operation of Wambo mine infrastructure (including minor upgrades to this infrastructure) under DA 305-7-2003.
- Phase 2 – underground mining operations at Wambo underground mine, the operation of Wambo mine infrastructure under DA 305-7-2003 and associated surface infrastructure.
- Phase 3 – following the cessation of underground mining operations that includes mine closure.

Phase 2 commenced on 1 December 2020, and open cut operations are now covered under State Significant Development (SSD) 7142. Operations under Development Consent DA 177-8-2004 have not changed following the commencement of Phase 2.

1.1.1 Wambo Coal Mine

The Mine was originally granted development consent by the 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 the Singleton Shire Council (SSC) between 1980 and 1991.



WAM-09-15_AR&FP_2022_218A

Source: NSW Spatial Services (2022)

Date prepared: 29-07-2022



- LEGEND**
- Local Government Area
 - National Parks and Wildlife Estate
 - State Forest
 - ⚡ Mining Operation
 - ⚡ Proposed Mining Operations (Under Assessment)
 - Coal - Current Titles
 - Project Approval Boundary

Peabody

WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

Regional Location

Figure 1

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 DA 108/91 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 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, 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 run-of-mine (ROM) coal.

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 of 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 enabled the expansion of the open cut operations and development of additional underground mining operations. The approved development described in the Project EIS and subsequent 17 modifications permit underground mining until 31 August 2042 and ROM coal production up to 14.7 Mtpa.

The Project EIS also addressed a separate 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.

ROM coal is either washed at the CHPP or, where in specification, bypassed 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 transported to the Port of Newcastle for export markets.

From 1 December 2020, the Mine transitioned into Phase 2 operations which includes underground mining and coal handling and processing, as described in DA 305-7-2003:

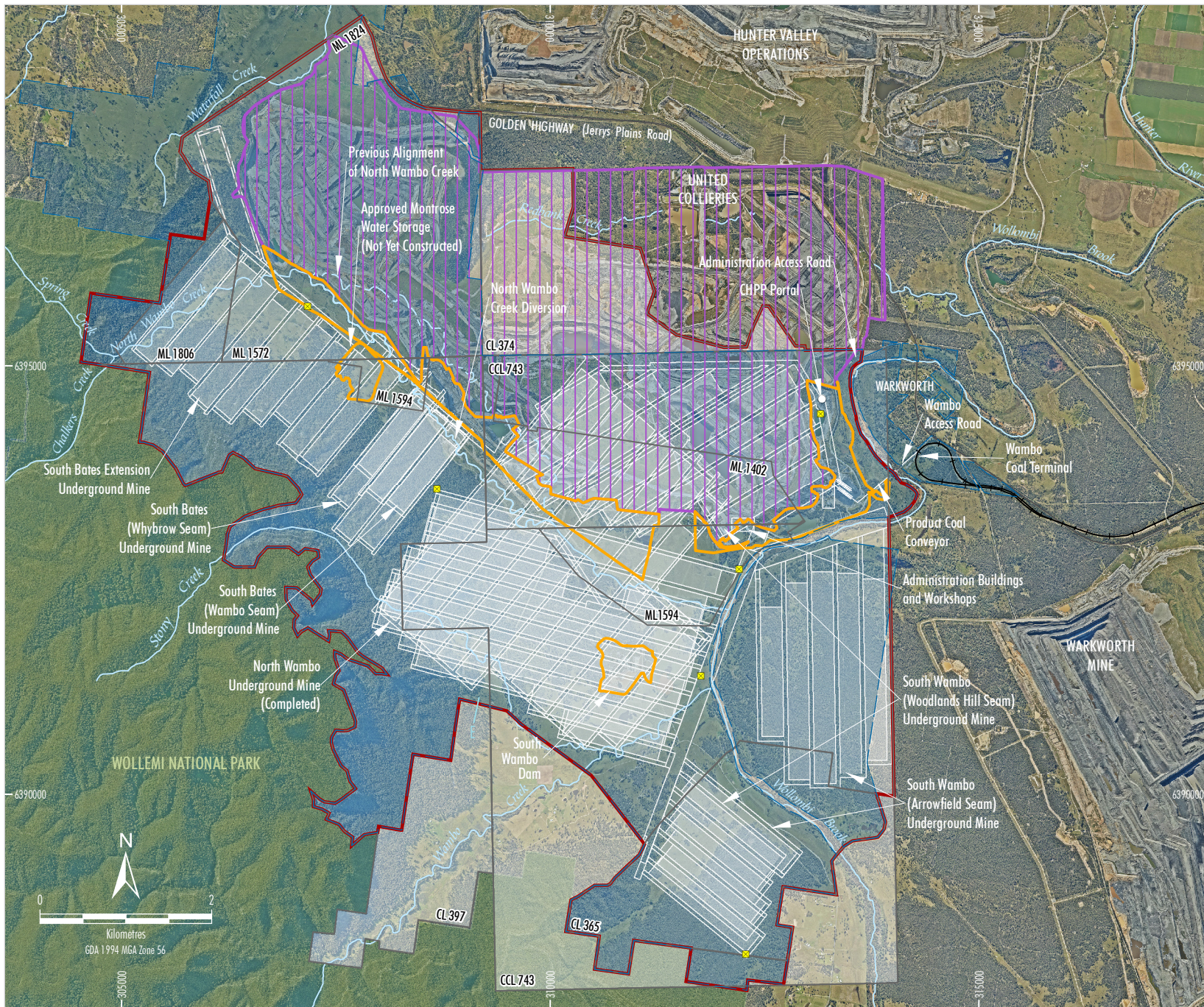
The phase of the development that comprises underground mining operations at Wambo underground mine, the operation of Wambo mine infrastructure within the green operational area identified in Figure 2 of Appendix 2 and associated surface development.

Since the commencement of Phase 2, the Mine no longer includes open cut mining operations. This Rehabilitation Management Plan (RMP) has been prepared in consideration of the Phase 2 operations at the Mine.

The Mine has the following approved underground mining operations (**Figure 2**):

- North Wambo Underground (NWU) Mine (commenced in 2005 and now completed);
- South Bates Underground (SBU) Mine, including the South Bates Extension Underground (SBUE) Mine (commenced in 2014 and currently operational); and
- South Wambo Underground (SWU) Mine (not yet commenced).

A summary of the approved Mine is provided in **Table 1**.



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - WCPL Owned Land
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Project Approval Boundary
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Existing/Approved Underground Development
 - Existing/Approved Underground Development (First Workings only)
 - Existing/Approved Ventilation Shaft

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022

Wambo Coal Mine
 General Arrangement

Figure 2

Table 1: Summary of Approved Wambo Coal Mine

Component	Approved Wambo Coal Pty Ltd ¹
Life of Mine	Underground mining operations may be carried out until 31 August 2042.
Open Cut Mining	No open cut mining activities following commencement of Phase 2 operations.
Underground Mining	Underground mining of up to 9.75 Mtpa of ROM coal in any calendar year. Extraction from the Whybrow, Wambo, Woodlands Hill and Arrowfield Seams.
Subsidence commitments and management	The subsidence impact performance measures listed in Conditions B1 and B4, Schedule 2, Part B of the Development Consent (DA 305-7-2003).
ROM Coal Production Rate	Up to 14.7 Mtpa of ROM coal from the Wambo Mining Complex and United Wambo open cut coal may be processed at the Wambo CHPP in any calendar year.
Total ROM Coal Mined	Underground ROM coal reserves estimated at 161.3 Mt.
Waste Rock Management	No open cut mining activities or associated waste rock management following commencement of Phase 2 operations.
Coal Washing	CHPP capable of processing approximately 1,800 tonnes per hour. ROM coal can be received from both the United Wambo Open Cut Coal Mine and the Mine.
CHPP Reject Management	Coarse rejects and tailings would be incorporated, encapsulated and/or capped within open cut voids and emplacement areas associated with the United Wambo Open Cut Coal Mine.
Coal Transportation	Carried out until 31 August 2042.
Total CHPP Rejects	Approximately 40.3 Mt of coarse rejects and approximately 24.5 Mt of tailings.
Water Supply	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. Ongoing exchange of water between the United Wambo Open Cut Coal Mine and the Wambo Coal Mine to allow for integration of the water management systems.
Surface Facilities	Construction of surface facilities within the approved surface development area.
Mining Tenements	Coal Lease (CL) 365, CL 374, CL 397, Consolidated Coal Lease (CCL) 743, Mining Lease (ML) 1402, ML 1572, ML 1594, ML1806, Authorisation (A) 444 and Exploration Licence (EL) 7211.

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

1.1.2 United Wambo Open Cut Mine

Development consent for coal mining at United was originally granted in the early 1980s. From July 1989 until July 1992, United comprised an open cut and auger mining operation extracting from the Whynot and Wambo seams. Underground mining operations at the mine commenced in 1992, continuing until March 2010 when operations were suspended with the mine entering a period of care and maintenance. At the time mining ceased, underground longwall mining operations at United were approved to provide up to 2.95 Mtpa of product coal. Exploration and pre-feasibility works were commenced to determine the potential for future mining activities within United's mining tenements. Ongoing exploration has identified substantial reserves of coal suitable for open cut mining. Prior to the demolition occurring in March 2020, United had a CHPP at the site which was capable of washing ROM coal from the underground operation for delivery to the export market.

From 1989 until 2006, product coal was transported from United by road along the Golden Highway to the Mount Thorley Coal Loader. Following the construction of the Wambo rail spur and loop in 2006, product coal from United was transported via the Wambo train loading facility, which subsequently allowed for the removal of United's coal haulage trucks from the Golden Highway. Prior to the demolition occurring in March 2020, United had a CHPP at the site which was capable of washing ROM coal from the underground operation for delivery to the export market. From 1989 until 2006, product coal was transported from United by road along the Golden Highway to the Mount Thorley Coal Loader.

Following commencement of Phase 2 at the Wambo Mine, open cut activities (including rehabilitation) became the responsibility of United and are now covered under SSD 7142. As such, rehabilitation activities associated with this area are described in the United Wambo Rehabilitation Management Plan.

1.1.3 Rehabilitation Previously Undertaken

Since the commencement of Phase 2, WCPL has been responsible for rehabilitating the remaining surface area and activities related to the Mine's approved underground activities. As the majority of the disturbed surface area (e.g. Infrastructure Areas) will be required for the life of the underground mine, there has been minimal progressive rehabilitation. To date, rehabilitation activities at the Mine have occurred where possible and have generally been limited to subsidence remediation, consisting of a combination of targeted subsidence campaigns and reactive subsidence remediation to sites ranging from small potholes to cracks several meters in length. Following its completion in 2007, the North Wambo Creek (NWC) Diversion has been progressively rehabilitated in accordance with the revegetation strategy and the North Wambo Creek Diversion Management Plan.

1.2 CURRENT DEVELOPMENT CONSENTS, LEASES AND LICENCES

Table 2 provides a summary of the key approvals, leases and licences that the Mine operates under.

Table 2: WCPL's Statutory Approvals

Relevant Authority	Instrument	Approval/Licence No.	Issue Date	Expiry Date
DPE	Development Consent	DA 305-7-2003	04/02/2004	31/12/2042
		DA 177-8-2004	16/12/2004	16/12/2025
RR	Mining Lease (ML)	CL 365	19/09/1990	19/09/2032
		CL 374	06/12/1991	21/03/2026
		CL 397	04/06/1992	04/06/2034
		CCL 743	09/03/1990	14/08/2022
		ML 1402	23/09/1996	14/08/2022
		ML 1572	21/12/2005	20/12/2026
		ML 1594	01/05/2007	30/04/2028
		ML 1806	11/08/2020	11/08/2041
	Exploration Licence (EL)	A444 ^{1, 2, 3}	16/05/1991	16/05/2021
		EL 7211 ⁴	29/09/2008	29/09/2026
EPA	Environmental Protection Licence (EPL)	EPL 529	-	-
WaterNSW	Water Access Licence (WAL)	Various	Refer to the Wambo Water Management Plan (WMP)	

Note: DPE = NSW Department of Planning and Environment. RR = NSW Resources Regulator. EPA = NSW Environment Protection Authority.

¹ At the time of preparing this RMP, a renewal application for A444 was still pending.

² A444 is an Authority to Prospect granted under the *Coal Mining Act 1973* and is deemed to be an EL for the purposes of the *Mining Act 1992*.

³ A444 is managed by United.

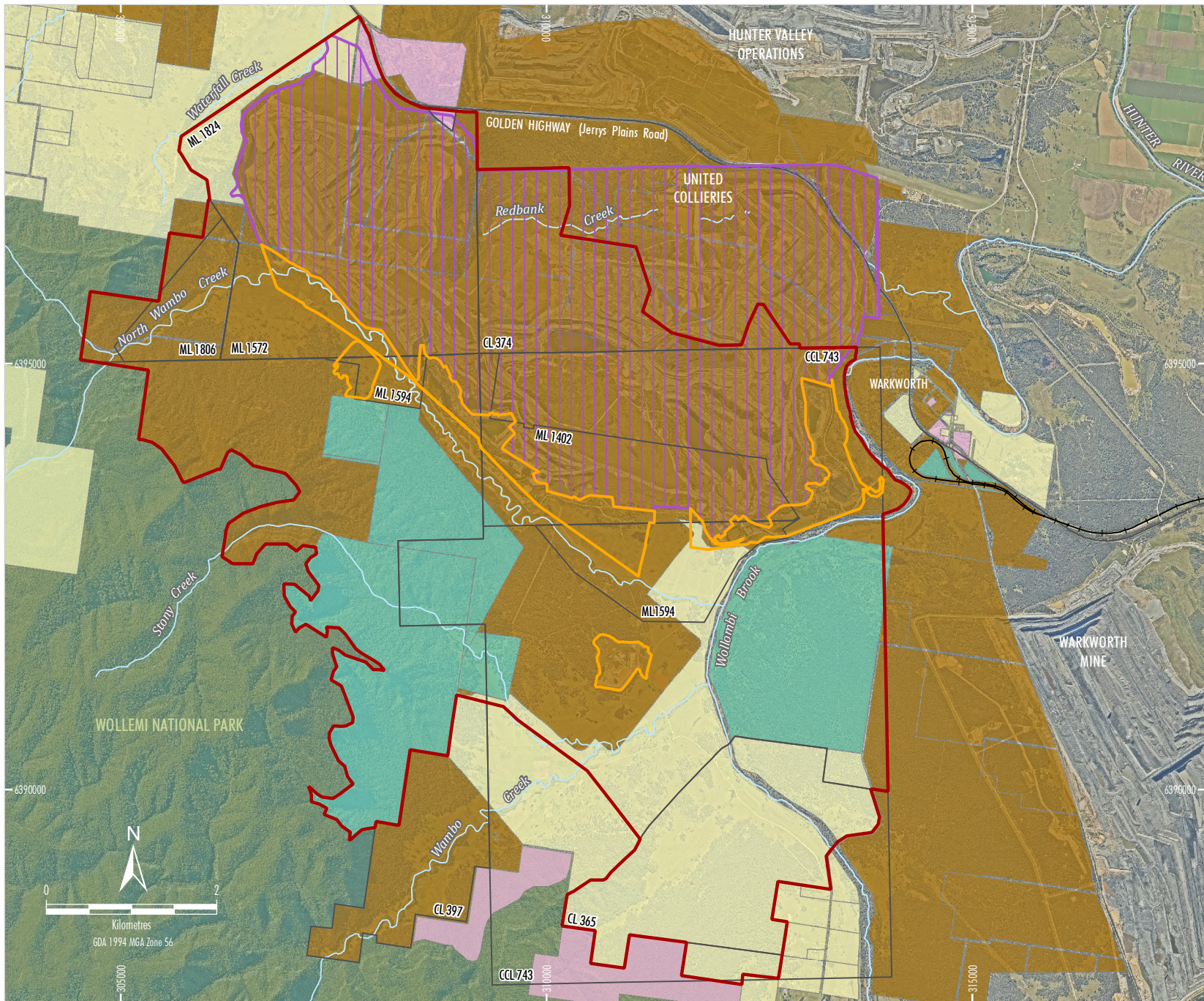
⁴ EL7211 is managed by United.

1.3 LAND OWNERSHIP AND LAND USE

Land use in the vicinity of the Mine 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) (**Figure 3**). WCPL controlled lands that are not subject to mining 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.

Significant areas of land which overlie the SBU mine, SBUE mine and SWU 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, while underground access to the SWU mine is via a box cut and portal (known as the CHPP portal) and associated mine entries. The open cut mining operation is bounded by the United Colliery and the Golden Highway to the north and Wollombi Brook to the east.

Figure 4 and **Table 3** identifies the schedule of land ownership surrounding the Mine.



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Land Use**
 - Mining
 - Remnant Woodland Enhancement Program (RWEPA) Area
 - Rural Residential
 - Crown Land
 - National Park

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

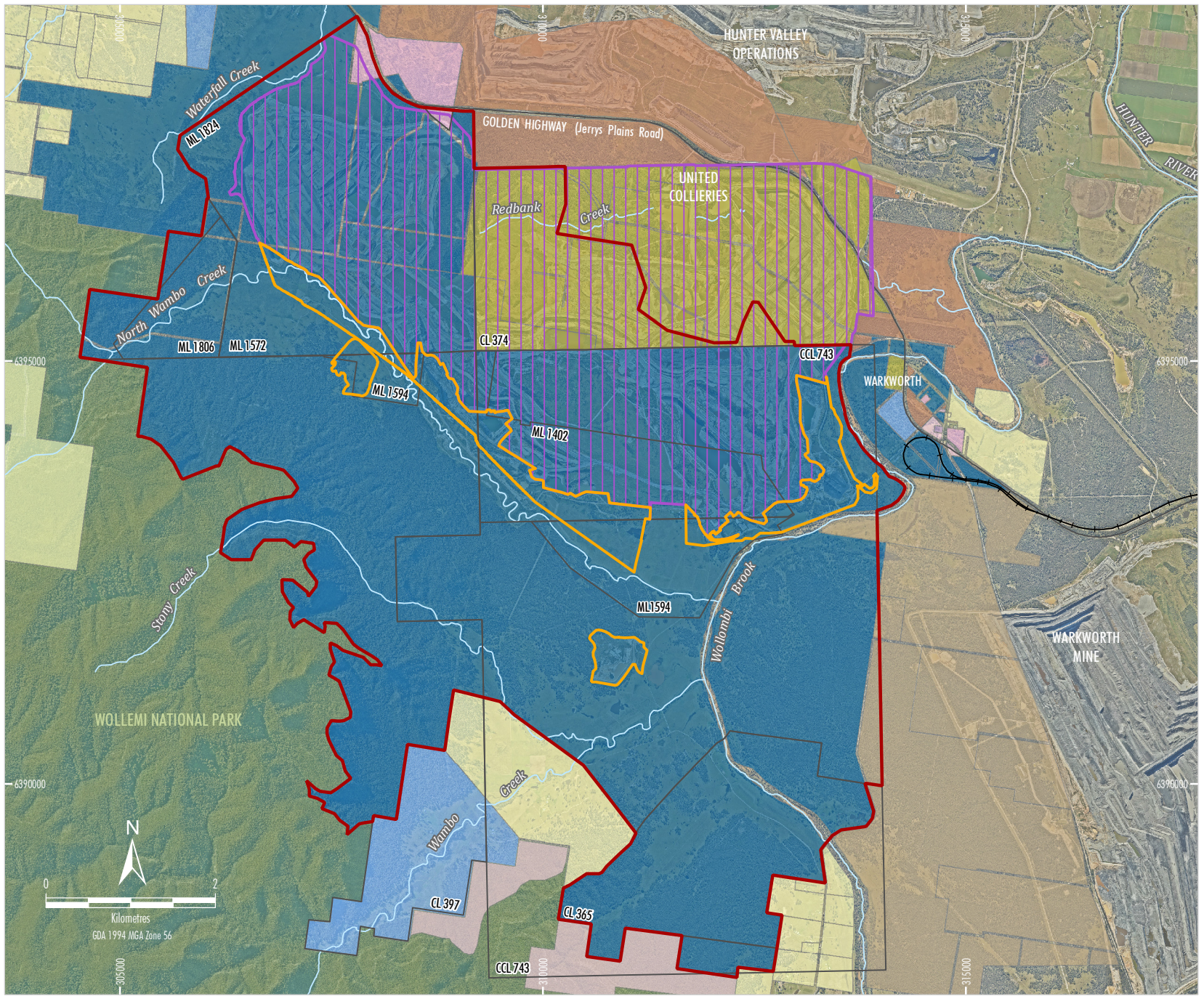
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WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022

Land Use

Figure 3



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Land Ownership**
 - Wambo Coal Pty Ltd
 - Joint Venture (Wambo Coal & United Collieries)
 - Glencore
 - Coal and Allied Pty Ltd
 - Warkworth Mining Limited
 - Crown Land
 - The State of NSW
 - Singleton Council
 - Telecommunication
 - Private Landholder
 - National Park

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

Land Ownership

Figure 4

Table 3: Overview of the Land Ownership Surrounding the Mine

Lot Sec DP*	Status	Land Ownership Schedule	Occupancy
1/110084	Freehold	WCPL	-
1/1089682	Freehold	WCPL	-
1/114970	Freehold	WCPL	-
1/709722	Freehold	WCPL	-
1/720705	Freehold	WCPL	-
1/241316	Freehold	WCPL	-
1/616303	Freehold	WCPL	-
1/1177768	Freehold	Glencore	-
1/1174490	Freehold	WCPL	-
100/753792	Freehold	WCPL	-
101/753792	Freehold	WCPL	-
103/753792	Freehold	WCPL	-
104/753792	Freehold	WCPL	-
109/753792	Freehold	WCPL	-
110/753792	Freehold	WCPL	-
111/753792	Freehold	WCPL	-
112/753792	Freehold	WCPL	-
113/753817	Freehold	WCPL	-
118/753792	Freehold	WCPL	-
129/755267	Freehold	Crown Land	-
131/1089157	Freehold	WCPL	-
160/753817	Freehold	WCPL	-
161/753817	Freehold	WCPL	-
170/823775	Freehold	Crown Land	-
175/823775	Freehold	Crown Land	-
18/753817	Freehold	WCPL	-
2/1085145	Freehold	WCPL	-
2/110084	Freehold	WCPL	Yes
2/709722	Freehold	WCPL	-
2/616303	Freehold	WCPL	-
2/617852	Freehold	WCPL	-
2/720705	Freehold	WCPL	-
2/1174490	Freehold	WCPL	-
208/753817	Freehold	Crown Land	-
22/753817	Freehold	WCPL	-
220/1135537	Freehold	Yancoal	-
23/3030	Freehold	WCPL	-
3/720705	Freehold	WCPL	-
3/1177768	Freehold	WCPL	-
3/1085145	Freehold	WCPL	-

Table 3: Overview of the Land Ownership Surrounding the Mine (Continued)

Lot Sec DP*	Status	Land Ownership Schedule	Occupancy
38/753792	Freehold	WCPL	-
39/753792	Freehold	WCPL	-
4/1085145	Freehold	WCPL	-
149/753792	Freehold	Crown Land	-
16/755267	Freehold	Yancoal	-
4/542226	Freehold	Crown Land	-
4/720705	Freehold	WCPL	-
45/753792	Freehold	WCPL	-
46/753792	Freehold	WCPL	-
49/753792	Freehold	WCPL	-
5/542226	Freehold	Crown Land	-
5/1085145	Freehold	Yancoal	-
50/753792	Freehold	WCPL	-
51/753792	Freehold	WCPL	-
52/753792	Freehold	WCPL	-
55/753792	Freehold	WCPL	-
57/1074788	Freehold	WCPL	Yes
58/753792	Freehold	WCPL	-
60/753792	Freehold	WCPL	-
61/753792	Freehold	WCPL	-
62/753792	Freehold	WCPL	-
63/753792	Freehold	WCPL	-
64/753792	Freehold	WCPL	-
66/753817	Freehold	Crown Land	-
67/753817	Freehold	Crown Land	-
7/3030	Freehold	WCPL	-
71/753817	Freehold	WCPL	-
79/1074787	Freehold	WCPL	-
79/753821	Freehold	WCPL	-
82/548749	Freehold	WCPL	-
83/548749	Freehold	WCPL	-
92/548749	Freehold	-	-
95/753792	Freehold	WCPL	-
A/33149	Freehold	WCPL	-
B/33149	Freehold	WCPL	-
C/33149	Freehold	WCPL	-
1/732501	Freehold	WCPL	-
2/732501	Freehold	WCPL	-
3/732501	Freehold	WCPL	-

Table 3: Overview of the Land Ownership Surrounding the Mine (Continued)

Lot Sec DP*	Status	Land Ownership Schedule	Occupancy
4/732501	Freehold	WCPL	-
5/732501	Freehold	WCPL	-
6/732501	Freehold	WCPL	-
3/753817	Freehold	WCPL	-
4/753817	Freehold	WCPL	-
5/753817	Freehold	WCPL	-
6/753817	Freehold	WCPL	-
10/753817	Freehold	WCPL	-
73/753817	Freehold	WCPL	-
Any Unidentified Historical Title Residues located within, between or adjacent to the above Parcels of Land	Freehold/Crown	-	-
Additional Lot and DPs listed for Roads and Wollombi Brook - Appendix A (DA 305-7-2003).			

Note: *As identified in DA 305-7-2003 (MOD18).

2 FINAL LAND USE

2.1 REGULATORY REQUIREMENTS FOR REHABILITATION

Relevant regulatory requirements for rehabilitation that apply to the post-mining land use and rehabilitation are described in **Table 4**.

Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation

Condition	Requirement	Area	Section Reference																		
DA 305-7-2003																					
B69	<i>The Applicant must implement the Biodiversity Offset Strategy set out in Table 9 and shown in Appendix 6, to the satisfaction of the Planning Secretary.</i>	Entire Site	Section 2.3.1																		
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Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation (Continued)

Condition	Requirement	Area	Section Reference														
DA 305-7-2003 (Continued)																	
B105	<p><i>The Applicant must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed rehabilitation activities described in the documents listed in condition A2(c) and must comply with the objectives in Table 10.</i></p> <p><i>Table 10: Rehabilitation Objectives</i></p> <table border="1" data-bbox="347 656 1155 1648"> <thead> <tr> <th data-bbox="347 656 564 696">Feature</th> <th data-bbox="564 656 1155 696">Objective</th> </tr> </thead> <tbody> <tr> <td data-bbox="347 696 564 779"><i>All areas of the site affected by the development</i></td> <td data-bbox="564 696 1155 779"> <ul style="list-style-type: none"> • <i>Safe, stable and non-polluting.</i> • <i>Fit for the intended post-mining land use/s.</i> </td> </tr> <tr> <td data-bbox="347 779 564 1081"><i>Areas proposed for native ecosystem re-establishment</i></td> <td data-bbox="564 779 1155 1081"> <ul style="list-style-type: none"> • <i>Establish a minimum of 270 hectares of Open Woodland Revegetation to satisfy condition B69.</i> • <i>Establish areas of self-sustaining:</i> <ul style="list-style-type: none"> – <i>Riparian vegetation, within any diverted and/or re-established creek lines and retained water features;</i> – <i>Habitat resources for threatened flora and fauna species; and</i> – <i>Vegetation connectivity and wildlife corridors, as far as is reasonable and feasible.</i> </td> </tr> <tr> <td data-bbox="347 1081 564 1290"><i>Final landform</i></td> <td data-bbox="564 1081 1155 1290"> <ul style="list-style-type: none"> • <i>Stable and sustainable for the intended post-mining land use/s.</i> • <i>Consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.</i> • <i>Maximise surface water drainage to the natural environment (excluding final void catchment).</i> </td> </tr> <tr> <td data-bbox="347 1290 564 1402"><i>Rehabilitated materials</i></td> <td data-bbox="564 1290 1155 1402"> <ul style="list-style-type: none"> • <i>Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources, to the greatest extent practicable.</i> </td> </tr> <tr> <td data-bbox="347 1402 564 1552"><i>Surface infrastructure of the development</i></td> <td data-bbox="564 1402 1155 1552"> <ul style="list-style-type: none"> • <i>Decommissioned and removed, unless the RR agrees otherwise.</i> • <i>All surface infrastructure sites are to be revegetated with suitable local native plant species to a landform consistent with the surrounding environment.</i> </td> </tr> <tr> <td data-bbox="347 1552 564 1648"><i>Portals and vent shafts of the development</i></td> <td data-bbox="564 1552 1155 1648"> <ul style="list-style-type: none"> • <i>To be decommissioned and made safe and stable.</i> • <i>Retain habitat for threatened species (e.g. bats), where practicable.</i> </td> </tr> </tbody> </table>	Feature	Objective	<i>All areas of the site affected by the development</i>	<ul style="list-style-type: none"> • <i>Safe, stable and non-polluting.</i> • <i>Fit for the intended post-mining land use/s.</i> 	<i>Areas proposed for native ecosystem re-establishment</i>	<ul style="list-style-type: none"> • <i>Establish a minimum of 270 hectares of Open Woodland Revegetation to satisfy condition B69.</i> • <i>Establish areas of self-sustaining:</i> <ul style="list-style-type: none"> – <i>Riparian vegetation, within any diverted and/or re-established creek lines and retained water features;</i> – <i>Habitat resources for threatened flora and fauna species; and</i> – <i>Vegetation connectivity and wildlife corridors, as far as is reasonable and feasible.</i> 	<i>Final landform</i>	<ul style="list-style-type: none"> • <i>Stable and sustainable for the intended post-mining land use/s.</i> • <i>Consistent with and complement the topography of the surrounding region to minimise the visual prominence of the final landforms in the post mining landscape.</i> • <i>Maximise surface water drainage to the natural environment (excluding final void catchment).</i> 	<i>Rehabilitated materials</i>	<ul style="list-style-type: none"> • <i>Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources, to the greatest extent practicable.</i> 	<i>Surface infrastructure of the development</i>	<ul style="list-style-type: none"> • <i>Decommissioned and removed, unless the RR agrees otherwise.</i> • <i>All surface infrastructure sites are to be revegetated with suitable local native plant species to a landform consistent with the surrounding environment.</i> 	<i>Portals and vent shafts of the development</i>	<ul style="list-style-type: none"> • <i>To be decommissioned and made safe and stable.</i> • <i>Retain habitat for threatened species (e.g. bats), where practicable.</i> 	Entire Site	Section 4
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Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation (Continued)

Condition	Requirement	Area	Section Reference	
DA 305-7-2003 (Continued)				
B105 (cont.)	<i>Table 10: Rehabilitation Objectives (Continued)</i>		Entire Site	Section 4
	Feature	Objective		
	<i>Watercourses subject to mine water discharges and/or subsidence impacts or environmental consequences that are greater than negligible</i>	<ul style="list-style-type: none"> Hydraulically and geomorphologically stable. Aquatic ecology and riparian vegetation that is the same or better than prior to commencement of mining. 		
	<i>Water quality</i>	<ul style="list-style-type: none"> Water retained on the site is fit for the intended post-mining land use/s. Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation. 		
	<i>Built features damaged by mining operations</i>	<ul style="list-style-type: none"> Repair to pre-mining condition or equivalent unless the: <ul style="list-style-type: none"> owner agrees otherwise; or damage is fully restored, repaired or compensated for under the Coal Mine Subsidence Compensation Act 2017. 		
	<i>Cliffs, minor cliffs, rock face features and steep slopes</i>	<ul style="list-style-type: none"> No additional risk to public safety compared to prior to mining. 		
	<i>Community</i>	<ul style="list-style-type: none"> Ensure public safety. Minimise adverse socio-economic effects associated with mine closure. 		
B106	<i>The rehabilitation objectives in Table 10 apply to the entire site, including all landforms constructed under either this consent or previous consents. However, the Applicant is not required to undertake any additional earthmoving works on landforms that have been approved and constructed under previous consents.</i>	Entire Site	-	
B107	<i>The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated.</i>	Entire Site	Sections 4 and 6.2	

Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation (Continued)

Condition	Requirement	Area	Section Reference
DA 305-7-2003 (Continued)			
B108	<p>Rehabilitation Management Plan</p> <p><i>The Applicant must prepare a Rehabilitation Management Plan for all land disturbed by the development in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This plan must:</i></p> <ul style="list-style-type: none"> <i>(a) be prepared by a suitably qualified and experienced person/s;</i> <i>(b) be prepared in consultation with the Department, DPIE Water, BCD and Council;</i> <i>(c) be prepared in accordance with any relevant MEG Guideline;</i> <i>(d) describe how the rehabilitation of the site would achieve the objectives identified in Table 10 and be integrated with the measures in the Biodiversity Management Plan referred to in condition B74 [sic];</i> <i>(e) describe how the rehabilitation of the site would be integrated with rehabilitation of the Wambo train loading facility and SSD 7142 United Wambo open cut coal mine;</i> <i>(f) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and for triggering remedial action (if necessary);</i> <i>(g) describe the measures to be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform, final land use/s and water management in the final landform;</i> <i>(h) include a detailed tailings management strategy that includes:</i> <ul style="list-style-type: none"> <i>(i) a strategy for treating and/or emplacing all tailings material generated by the Wambo CHPP; and</i> <i>(ii) timing for rehabilitation of all tailings storage facilities, in order that final landform and land use objectives can be achieved in a timely manner;</i> <i>(i) include procedures for the use of interim stabilisation and temporary vegetation strategies, where reasonable to minimise the area exposed for dust generation;</i> <i>(j) include a program to monitor, independently audit and report on the effectiveness of the measures in paragraph (g), and progress against the detailed performance and completion criteria in paragraph (f);</i> <i>(k) to the maximum extent practicable build on and integrate with the other management plans required under this consent; and</i> <i>(l) include detailed scheduling for progressive rehabilitation to be initiated, undertaken and/or completed over the next three years.</i> 	Entire Site	<p>Section 2.1</p> <p>Section 4.1</p> <p>Section 2.1</p> <p>Sections 6.2 and 10</p> <p>Section 6.2.2</p> <p>Section 4</p> <p>Section 4</p> <p>United Wambo RMP</p> <p>Section 6.2</p> <p>Sections 4, 8, 10 and 11</p> <p>This RMP</p> <p>Section 6.1</p>

Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation (Continued)

Condition	Requirements	Area	Section Reference
ML1402, ML 1572, ML 1594, ML 1806			
Condition 4, Schedule 8A	<p>Must prevent or minimise harm to environment</p> <p>(1) <i>The holder of a mining lease must take all reasonable measures to prevent, or if that is not reasonably practicable, to minimise, harm to the environment caused by activities under the mining lease.</i></p> <p>(2) <i>In this clause –</i> harm to the environment has the same meaning as in the Protection of the Environment Operations Act 1997</p>	Entire Site	This RMP
Condition 5, Schedule 8A	<p>Rehabilitation to occur as soon as reasonably practicable after disturbance</p> <p><i>The holder of a mining lease must rehabilitate land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs.</i></p>	Entire Site	Section 6.2
Condition 6, Schedule 8A	<p>Rehabilitation must achieve final land use</p> <p>(1) <i>The holder of a mining lease must ensure that rehabilitation of the mining area achieves the final land use for the mining area</i></p> <p>(2) <i>The holder of the mining lease must ensure any planning approvals has been obtained that is necessary to enable the holder to comply with subclause (1)</i></p> <p>(3) <i>The holder of the mining lease must identify and record any reasonably foreseeable hazard that presents a risk to the holder's ability to comply with subclause (1).</i></p> <p>Note – <i>Clause 7 requires a rehabilitation risk assessment to be conducted whenever a hazard is identified under this subclause.</i></p> <p>(4) <i>In this clause –</i> final land use for the mining area means the final landform and land uses to be achieved for the mining area –</p> <p>(a) <i>as set out in the rehabilitation objectives statement and rehabilitation completion criteria statement, and</i></p> <p>(b) <i>for a large mine – as spatially depicted in the final landform and rehabilitation plan, and</i></p> <p>(c) <i>if the final land use for the mining area is required by a condition of development consent for activities under the mining lease – as stated in the condition.</i></p> <p>Planning approval means –</p> <p>(a) <i>a development consent within the meaning of the Environmental Planning and Assessment Act 1979, or</i></p> <p>(b) <i>an approval under that Act, Division 5.1.</i></p>	Entire Site	Section 4 Section 2.1 Section 3

**Table 4: Regulatory Requirements Relating to Post-Mining Land Use
and Rehabilitation (Continued)**

Condition	Requirements	Area	Section Reference
ML1402, ML 1572, ML 1594, ML 1806 (Continued)			
Condition 7, Schedule 8A	<p>Rehabilitation risk assessment</p> <p>(1) <i>The holder of a mining lease must conduct a risk assessment (a rehabilitation risk assessment) that –</i></p> <p>(d) <i>Identified, assess and evaluates the risks that need to be addressed to achieve the following in relation to the mining lease –</i></p> <ul style="list-style-type: none"> (i) <i>the rehabilitation objectives,</i> (i) <i>the rehabilitation completion criteria,</i> (i) <i>for large mines – the final land use as spatially depicted in the final landform and rehabilitation plan, and</i> <p>(a) <i>identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks.</i></p> <p>(2) <i>The holder of a mining lease must implement the measures identified.</i></p> <p>(3) <i>The holder of a mining lease must conduct a rehabilitation risk assessment –</i></p> <ul style="list-style-type: none"> (a) <i>for a large mine – before preparing a rehabilitation plan, and</i> (b) <i>for a small mine – before preparing the rehabilitation outcome documents for the mine, and</i> (c) <i>whenever a hazard is identified under clause 6(3) – as soon as reasonably practicable after it is identified, and</i> (d) <i>whenever given a written direction to do so by the Secretary.</i> 	Entire Site	Section 3 Section 3 Section 3

Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation (Continued)

Condition	Requirements	Area	Section Reference
ML1402, ML 1572, ML 1594, ML 1806 (Continued)			
Condition 10, Schedule 8A	<p>Rehabilitation management plans for large mines</p> <p>(1) <i>The holder of a mining lease relating to a large mine must prepare a plan (a rehabilitation management plan) for the mining lease that includes the following –</i></p> <p>(e) <i>a description of how the holder proposes to manage all aspects of the rehabilitation of the mining area,</i></p> <p>(f) <i>a description of the steps and actions the holder proposes to take to comply with the conditions of the mining lease that relate to rehabilitation,</i></p> <p>(g) <i>a summary of rehabilitation risk assessments conducted by the holder,</i></p> <p>(h) <i>the risk control measures identified in the rehabilitation risk assessments,</i></p> <p>(i) <i>the rehabilitation outcome documents for the mining lease,</i></p> <p>(j) <i>a statement of the performance outcomes for the matters addressed by the rehabilitation outcome documents and the ways in which those outcomes are to be measured and monitored.</i></p> <p>(2) <i>If a rehabilitation outcome document has not been approved by the Secretary, the holder of the mining lease must include a proposed version of the document.</i></p> <p>(3) <i>A rehabilitation management plan is not required to be given to the Secretary for approval.</i></p> <p>(4) <i>The holder of the mining lease –</i></p> <p>(a) <i>Must implement the matters set out in the rehabilitation management plan, and</i></p> <p>(b) <i>If the forward program specifies timeframes for the implementation of the matters – must implement the matters within those timeframes.</i></p>	Entire Site	<p>This RMP</p> <p>Section 6.2</p> <p>Section 5</p> <p>Section 3</p> <p>Section 3</p> <p>Sections 4 and 5</p> <p>Section 4</p> <p>Sections 4 and 5</p> <p>NA</p>
Condition 12, Schedule 8A	<p>Rehabilitation outcome documents</p> <p>(1) <i>The holder of a mining lease must prepare the following documents (the rehabilitation outcome documents) for the mining lease and give them to the Secretary for approval –</i></p> <p>(a) <i>the rehabilitation objectives statement, which sets out the rehabilitation objectives required to achieve the final land use for the mining area,</i></p> <p>(b) <i>the rehabilitation completion criteria statement, which sets out criteria, the completion of which will demonstrate the achievement of the rehabilitation objectives,</i></p> <p>(c) <i>for a large mine, the final landform and rehabilitation plan, showing a spatial depiction of the final land use.</i></p> <p>(2) <i>If the final land use for the mining area is required by a condition of development consent for activities under the mining lease, the holder of the mining lease must ensure the rehabilitation outcome documents are consistent with that condition.</i></p>	Entire Site	<p>Section 4</p> <p>Section 4</p> <p>Section 5</p>

Table 4: Regulatory Requirements Relating to Post-Mining Land Use and Rehabilitation (Continued)

Condition	Requirements	Area	Section Reference
CL397			
2	Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.	CL397	This RMP
3(f)	The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must: <ul style="list-style-type: none"> i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP; ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines. <p><i>Note: The Rehabilitation Report replaces the Annual Environmental Management Report.</i></p>	CL397	This RMP
CCL743, ML1402			
4	The lease holder must lodge Environmental Management Reports (EMR) with the Director-General annually or at dates otherwise directed by the Director-General.	CCL743, ML1402	Section 8.3
5(b)	The EMR must report on progress in respect of rehabilitation completion criteria.	CCL743, ML1402	Section 8.3
7	Disturbed land must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the Director-General	CCL743, ML1402	This RMP
A444			
6	The licence holder must carry out rehabilitation of all disturbance caused by activities carried out under this licence in accordance with the requirements in Part B of the <i>Exploration Code of Practice – Rehabilitation</i> (NSW Department of Planning and Environment) to the satisfaction of the Minister.	A444	This RMP

Note: BCD = Biodiversity and Conservation Division, MEG = Mining, Exploration and Geoscience within Regional NSW, MOP = Mining Operations Plan, ha = hectares, DPIE = Department of Planning, Industry and Environment.

This RMP has been prepared by qualified and experienced WCPL onsite environmental and mining personnel, with assistance from suitably qualified experts (Resource Strategies Pty Ltd and Eco Logical Australia Pty Ltd) where required.

2.2 FINAL LAND USE OPTIONS ASSESSMENT

The approved final land use for the Mine is detailed in the Project EIS (WCPL, 2003) and DA 305-7-2003. The final landform for WCPL 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.

During the preparation of the Project EIS (WCPL, 2003), consultation was undertaken with the following:

- SSC;
- NSW Government authorities;
- Commonwealth Government authorities;
- local community groups;
- the Upper Hunter Wonnarua Council; and
- the Aboriginal community.

This consultation included the opportunity to review and comment on the proposed final land uses outlined in the Project EIS.

Since approval was granted in 2004, a number of Modifications to the Development Consent (DA 305-7-2003) have been approved. Where significant changes were proposed, the community and other relevant stakeholders were provided with the opportunity to submit comments on any relevant components of the proposed Modification.

All issues raised in the consultation process with regard to the final landform or final land use were addressed in the assessment processes and are reflected in the DA 305-7-2003 conditions.

WCPL acknowledges that the SSC has prepared a Local Strategic Planning Statement (LSPS), as required under the provisions of Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The LSPS identifies the following opportunities for the Singleton shire to grow and innovate of relevance to the Mine:

- Delivery of leading practice outcomes for post-mined land, which would involve collaborative pre-planning and investigation.
- Protecting, conserving and better utilisation of the natural, historic and cultural landscapes of the Local Government Area in a manner that is sustainable and respectful and does not detract from significance and meaning associated with the landscapes.

To ensure the post-mining landform and land-use is consistent with community expectations, WCPL will continue to consult with SSC and the community.

2.3 FINAL LAND USE STATEMENT

As required by Condition B105, Schedule 2 of DA 305-7-2003, the final land use and rehabilitation objectives outlined in **Sections 4 and 5**, respectively, are generally in accordance with the final landform proposed in the Project EIS and associated documentation.

The final landform and final land use are in accordance with the proposed final landform detailed in the Project EIS, and in consideration of the *Synoptic Plan for integrated landscape rehabilitation across the Upper Hunter Valley* (NSW Department of Mineral Resources, 1999) and the terminology requirements of the RR's (2021) *Form and Way: Rehabilitation Management Plan for Large Mines* (the RMP Form and Way Guidelines).

The final land use will comprise of:

- agricultural – grazing areas;
- native ecosystem areas; and
- water management areas.

The proposed final landform and final land use are further described in **Section 5**.

2.3.1 Biodiversity Offset Areas

Remnant Woodland Enhancement Programme

The Remnant Woodland Enhancement Programme (RWEPP) implements strategies for the conservation and enhancement of areas of remnant woodland adjacent to Wollemi National Park and Warkworth Sands. Conservation and enhancement of these areas will strengthen linkages between Wollemi National Park, existing remnant vegetation and woodland rehabilitation areas.

As part of the Biodiversity Offset Strategy (Condition B69, Schedule 2 of DA 305-7-2003), the rehabilitation will comprise of remnant woodland areas and open woodland revegetation as detailed in Appendix 6 of DA 305-7-2003 and shown in **Figure 5**. In accordance with Condition B70, Schedule 2 of DA 305-7-2003, the size of the RWEPP areas are described in **Table 5**.

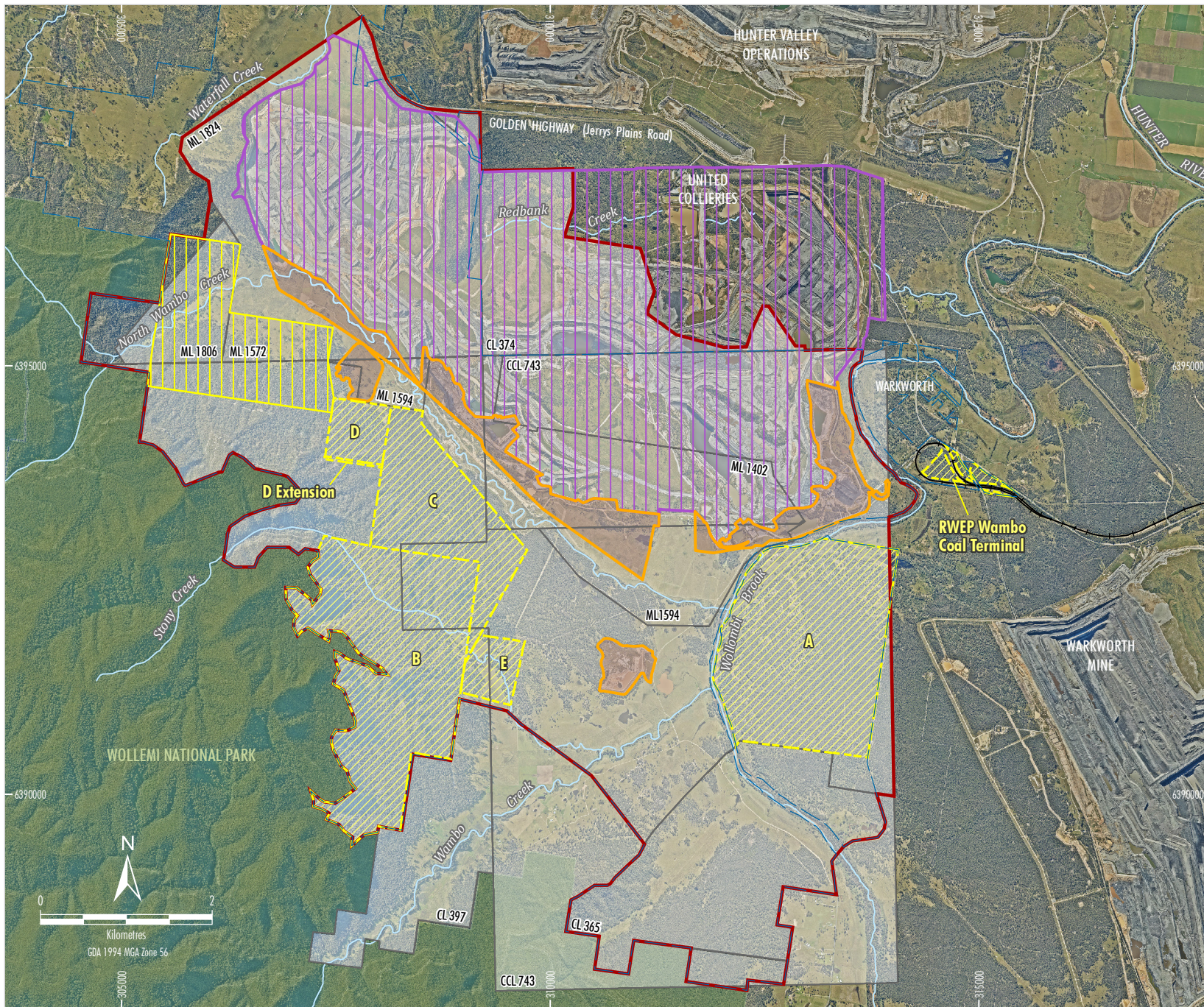
Table 5: Open Woodland and Remnant Woodland Areas

Area	Size (ha)
Remnant Woodland Enhancement Area A	424
Remnant Woodland Enhancement Area B	454
Remnant Woodland Enhancement Area C	211
Open Woodland Revegetation	270
Remnant Woodland Enhancement Area D	46
Remnant Woodland Enhancement Area D Extension	2
Remnant Woodland Enhancement Area E	41.6
Remnant Woodland Enhancement Area for the Wambo Coal Terminal	Figure 5

Note: The area of Open Woodland Revegetation was previously 1,570 ha. Under Environmental Assessment (Mod 16) this obligation was reduced to 270 ha, with the remaining area being taken up by SSD 7142. Additional offsets may be required by the Planning Secretary under condition B3.

Condition B71, Schedule 2 of DA 305-7-2003 states:

The land used to satisfy the requirement to establish Open Woodland Revegetation under condition B69 cannot be the same land as land used for Open Woodland Revegetation or Ecological Mine Rehabilitation under SSD 7142. If the United Wambo open cut coal mine does not proceed to Phase 2 (as defined within SSD 7142) then the Applicant must establish an additional 1,300 hectares of Open Woodland Revegetation, as otherwise required under SSD 7142.

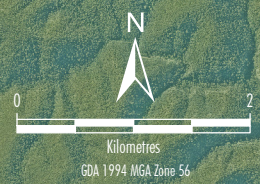


- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - WCPL Owned Land
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Biodiversity Offset Area under SSD 7142
 - Remnant Woodland Enhancement Program (RWEF) Area
 - Project Approval Boundary
 - Existing/Approved Wambo Coal Mine Surface Development Area

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



Peabody
WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

**Remnant Woodland Revegetation
 and Biodiversity Offset Areas**

Figure 5

United Wambo Biodiversity Offset Area

In accordance with Development Consent SSD 7142, United Wambo is responsible for establishing a Biodiversity Offset Strategy to appropriately compensate for the loss of ecological value as a result of the United Wambo Project. As part of the Biodiversity Offset Strategy, United Wambo developed the Wambo Biodiversity Stewardship Site, which partially overlies the underground mining area, within the Mine’s Project Approval Boundary (**Figure 5**).

The Wambo Biodiversity Stewardship Site is discussed further in the United Wambo Biodiversity Management Plan.

2.4 FINAL LAND USE AND MINING DOMAINS

2.4.1 Final Land Use Domains

Final land use domains for the Mine are listed in **Table 6** and shown in **Section 5**. Final land use domains are land management units characterised by a similar post-mining land use objective.

Table 6: Final Land Use Domains

Final Land Use Domains	Code
Native Ecosystem	A
Agricultural - Grazing	B
Water Management Areas	F
Water Storage (Excluding Final Void)	G
Infrastructure	I

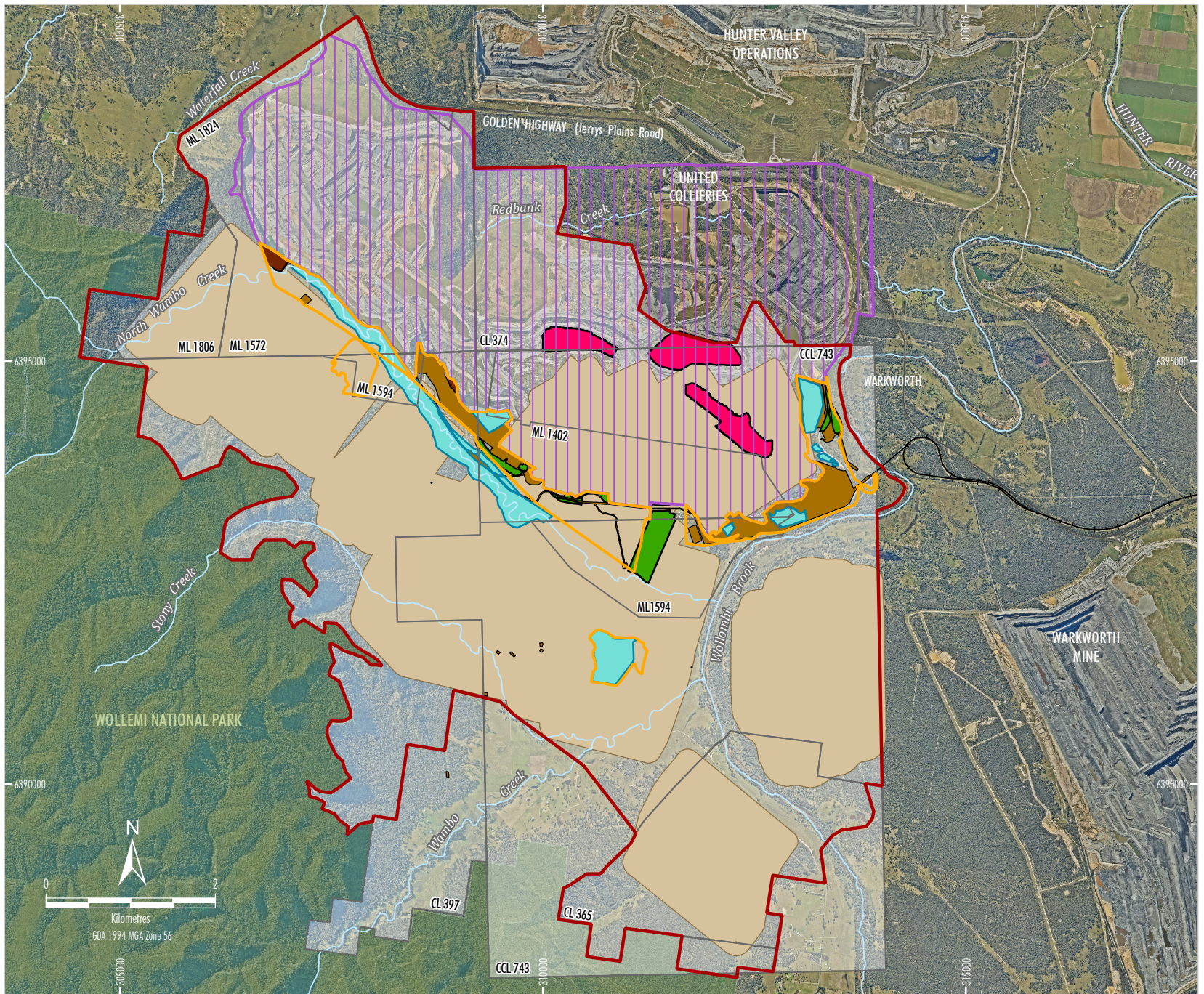
Areas outside the existing/approved Wambo Coal Mine surface development area (**Figure 2**) are expected to require significantly less rehabilitation works to those areas within the surface development area. Accordingly, WCPL has developed separate rehabilitation completion criteria for areas outside the surface development area to areas inside the surface development area (**Section 4**).

2.4.2 Mining Domains

Mining domains for the Mine are listed in **Table 7** and are shown on **Figure 6**. These mining domains can be defined as land management units within the Mine boundary, which have been delineated based on operational and functional purpose and therefore similar geophysical characteristics.

Table 7: Mining Domains

Mining Domains	Code
Infrastructure Area	1
Tailings Storage Facility	2
Water Management Area	3
Overburden Emplacement Area	4
Underground Mining Area (SMP)	6
Other (Rehabilitation)	8



LEGEND

- +— Wambo Coal Mine Rail Spur and Loop
- National Park
- Coal - Current Titles
- ▨ SSD 7142 Operational Area #
- ▭ Existing/Approved Wambo Coal Mine Surface Development Area
- ▭ Project Approval Boundary

Mining Domain Types

- Infrastructure Area
- Tailings Storage Facility
- Overburden Emplacement Area
- Underground Mining Area (SMP)
- Other (Rehabilitation)
- Water Management Area

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022

Peabody

WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

Existing Mining Domains

Figure 6

3 REHABILITATION RISK ASSESSMENT

The key risks associated with rehabilitation have been identified and assessed in a risk assessment undertaken in July 2020 in accordance with Clause 7, Schedule 8a of the *Mining Regulation 2016*, and in consideration of *Guideline: Rehabilitation Risk Assessment* and the *Joint Australian and New Zealand Standard AS/NZS 31000:2009 Risk Management – Principles and Guidelines*. A copy of the Rehabilitation Risk Assessment is provided in **Attachment 1**.

The method used for the risk assessment encompassed the following key steps:

- identifying the related risks, including what could happen, when and where;
- analysing the risks using a qualitative risk approach (i.e. identifying existing controls, determining specific consequences/likelihoods and then determining the residual level of risk);
- making decisions based on the outcomes of the risk assessment about which of the risks need controls or the implementation of a mitigation strategy; and
- establishing controls to mitigate/treat the risks identified as part of the process.

A total of 87 risks were identified and considered during the risk assessment. Of these risks, 60 were ranked as low, 22 were ranked as low to medium and five were ranked as medium. No risks were ranked as high.

Note, some risks were duplicated during different rehabilitation phases, for example potential weather impacts was ranked as a low to medium risk during ecosystem establishment and also during ecosystem and land use development.

The following five risks were ranked as medium:

- Insufficient skills and experience of rehabilitation personal resulting in rehabilitation being inadequate for sign off from RR and relinquishment unsuccessful.
- Lack of clearly defined responsibilities resulting in rehabilitation being inadequate for sign off from RR and relinquishment unsuccessful.
- Poor topsoil management practices (e.g. topsoil and subsoil not separated and/or topsoil not stockpiled appropriately) resulting in the importation of additional topsoil resources.
- Subsoil and topsoil deficit resulting in insufficient/inadequate topsoil resources to rehabilitate requiring the importation of additional topsoil resources.
- Materials prone to spontaneous combustion resulting in a spontaneous combustion event.

Relevant controls for each risk identified during the risk assessment are provided in **Attachment 1**. Management and mitigation measures to address each risk are discussed in **Sections 6.2 and 10.2**.

In addition to the above, WCPL has reviewed the AdaptNSW climate change modelling (and in particular, the snapshot provided for the Hunter region) and acknowledges that, of relevance to the Mine, in the near future (2023 – 2039) (Office of Environment and Heritage [OEH], 2014):

- Maximum temperatures are projected to increase by 0.4 – 1.0 degrees Celsius (°C).
- Minimum temperatures are projected to increase by 0.5 – 0.9°C.

- Rainfall is projected to decrease in spring and winter.
- Average fire weather risk is projected to increase in summer, spring and winter.

WCPL notes that the key risk to rehabilitation associated with the above changes is the increase in fire weather risk. WCPL has an existing Bushfire Management Plan prepared in consultation with the Rural Fire Service and SSC to manage this risk throughout the life of the mine.

4 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

The overall objective for the final rehabilitated landform is to establish a safe, stable and non-polluting landform that is compatible with the surrounding landscape and fit for the intended post-mining land use.

In accordance with Clause 12, Schedule 8A of the *Mining Regulation 2016*, the Rehabilitation Objectives have been submitted to the RR for approval. Following approval of the rehabilitation objectives, this RMP will be amended to include the approved Rehabilitation Objectives.

4.1 REHABILITATION OBJECTIVES AND COMPLETION CRITERIA

The rehabilitation objectives are considered to be broader objectives that cover specific aspects of rehabilitation. To complement these objectives, WCPL has developed performance indicators and completion criteria for each domain and rehabilitation phase based on the SMART principle. The objectives, indicators and completion criteria for each of the final land use and mining domains during the rehabilitation phases are specified in **Table 8**.

In accordance with Clause 12, Schedule 8A of the *Mining Regulation 2016*, the Rehabilitation Completion Criteria have been submitted to the RR for approval. Following approval of the Rehabilitation Completion Criteria, the RMP will be amended to substitute the proposed version (**Table 8**) with the version approved by the RR in accordance with Clause 11, Schedule 8A of the *Mining Regulation 2016*.

In addition to the rehabilitation objectives and rehabilitation completion criteria outlined in **Table 8**, where any built features have been damaged by WCPL's mining operations, WCPL would repair the feature to pre-mining condition or equivalent unless the owner agrees otherwise or damage is fully restored, repaired or compensated for under the *Coal Mine Subsidence Compensation Act 2017*.

WCPL would also ensure that there is no additional risk to public safety (compared to prior to mining) from cliffs, minor cliffs, rock face features and steep slopes in the operational areas.

Site security measures will be implemented for the duration of the Mine. These measures will be maintained during closure, decommissioning and demolition activities to prevent unauthorised access and to ensure public safety. Security measures will include:

- fencing and signposting of the site;
- security patrols;
- all personnel, contractors and visitors will be required to undertake a relevant site induction and sign in and out of the site; and
- all visitors will be required to be accompanied by a site representative at all times.

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).

In consultation with the relevant stakeholders, the preliminary completion criteria and associated rehabilitation tables will be reviewed and refined. The refinement of the criteria will involve, but not be limited to, using the results from research and rehabilitation trials and monitoring results from the various existing and proposed monitoring programs as outlined in **Sections 8 and 9**. The refinement of the completion criteria will be utilised to quantitatively demonstrate the progress and ultimate rehabilitation success throughout the life of the Mine.

To minimise the adverse socio-economic effects associated with mine closure, WCPL will:

- Notify the community and workforce of upcoming closure and provide regular updates on the status of the Mine.
- Reduce the Mine work force progressively as closure approaches (if possible).
- Where possible, WCPL would work with other Peabody sites to provide employment opportunities to workers.

As operations approach completion at the Mine (i.e. within five years of closure), this RMP will be updated to provide further detail on measures to be taken to minimise the potential adverse socio-economic effects associated with mine closure.

Table 8: Proposed Rehabilitation Objectives and Completion Criteria

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method							
Domain A: Native Ecosystem	Domain 1: Infrastructure Area Domain 2: Tailings Storage Facility Domain 3: Water Management Area Domain 4: Overburden Emplacement Area Domain 8: Other (Rehabilitation)	<ul style="list-style-type: none"> All hazardous materials and contaminated materials removed. 	Removal of contaminants.	Removal of contaminated sediments from mine water dams has been completed. Removal of contaminated sediments verified in contamination specialist's reports.	Copies of assessments undertaken made available. Record of activities and statement of completion provided.							
			Acid mine drainage.	No evidence of acid mine drained (AMD)..	Monitoring of water quality in accordance with WMP. Testing of overburden material to confirm minimal AMD potential.							
			Spontaneous combustion.	No spontaneous combustion evident at mine closure, decommissioning and during landform establishment.	Monitoring for events in accordance with Spontaneous Combustion Management Plan.							
		<ul style="list-style-type: none"> All infrastructure removed that is not required post-closure. Domain does not present a greater safety hazard than surrounding land. 	Removal of infrastructure.	All redundant infrastructure have been removed.	Record of activities and statement of completion provided. Photographic record of decommissioned sites.							
			Removal of all services.	All redundant services have been disconnected and removed.								
		<ul style="list-style-type: none"> Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation in accordance with the EPL water quality criteria. Water quality non-polluting and appropriate for conservation end land use. 	Removal of supernatant water.	Dewatering (where necessary) of remaining surface water above tailings has been completed.	Record of pumping activities.							
			Dewater mine water dams.	All mine water dams that are not required at post-closure have been completely dewatered.								
			Management of mine water	All water discharged from site meets relevant volumes and quality as specified by EPL 529.								
		<ul style="list-style-type: none"> Tailings Storage Facility capping designed to prevent soil erosion and exposure to material beneath. 	Tailings capping.	Tailings capped with 2 metres (m) to 5 m (subject to final design requirements) of inert overburden material.	Testing of waste rock material. Supported by "as constructed" final landform plan. Record of activities and statement of completion provided.							
			Coarse rejects capped.	Coarse rejects capped with a minimum of 2 m of inert overburden material.								
		<ul style="list-style-type: none"> Soil properties are suitable for the establishment and maintenance of selected vegetation species. 	Material characterisation.	Material characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.	Managed in accordance with Topsoil Management Procedure. Record of activities and statement of completion provided.							
			Application of ameliorants.	Application of appropriate soil ameliorants applied (at specified rate) has been completed.								
			pH.	Soil pH (H ₂ O) range: pH 5.5 – 7.8.								
			EC.	Soil EC (H ₂ O) ≤1200 µS/cm.								
			Topsoil depth.	Topsoil has been applied at a minimum of approximately 100 mm thickness in all areas and/or otherwise been achieved with the addition of humus/compost material to form a topsoil/composite mix.								
			Topsoil characterisation.	Topsoil characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.								
			Topsoil (Phosphorous).	<table border="1"> <thead> <tr> <th>Phosphate Test Method</th> <th>Native Vegetation</th> </tr> </thead> <tbody> <tr> <td>Colwell</td> <td>10 – 20 mg/kg</td> </tr> <tr> <td>Bray</td> <td>6 – 12 mg/kg</td> </tr> </tbody> </table>		Phosphate Test Method	Native Vegetation	Colwell	10 – 20 mg/kg	Bray	6 – 12 mg/kg	
				Phosphate Test Method		Native Vegetation						
				Colwell		10 – 20 mg/kg						
			Bray	6 – 12 mg/kg								
Topsoil (Organic Carbon).	Organic Matter % (grams/100 grams) >3%.											
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.											

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method
Domain A: Native Ecosystem (Continued)	Domain 1: Infrastructure Area Domain 2: Tailings Storage Facility Domain 3: Water Management Area Domain 4: Overburden Emplacement Area Domain 8: Other (Rehabilitation) (Continued)	<ul style="list-style-type: none"> Portals and vent shafts will be retained as habitat for threatened species (e.g. bats), where practicable. 	Sealing of portals and vent shafts.	All portals and vent shafts have been sealed unless they are to be retained as habitat for threatened species (e.g. bats).	Record of activities and statement of completion provided. Photographic record of decommissioned sites.
		<ul style="list-style-type: none"> Rehabilitated land will be geotechnically stable and will not present a greater safety hazard than surrounding land. 	Landform stability.	No slumping evident.	Supported by "as constructed" final landform plan. LiDAR scans of final landform. Photographic record. Final landform inspections.
		<ul style="list-style-type: none"> 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. Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. 	Slope gradients.	No greater than 1:6 (10 degrees (°) or 17%) across the entire ML area (unless otherwise agreed by the RR).	Supported by "as constructed" final landform plan. Final landform inspections. Supported by "as constructed" final landform plan. Final landform inspections. Photographic record.
			Slope lengths.	Slope length within range of 50 m – 80 m (subject to slope gradient).	
			Final landform height.	Final landform height ≤160 m Australian Height Datum (AHD).	
			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.	
			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.	
			Coarse rejects on surface.	No coarse rejects within the waste rock emplacement areas to be within 2 m of the final landform surface Reference Level (RL).	
			Large rocks on surface.	Rock raking of the final landform completed to remove rocks >200 mm in diameter.	
			Capping drainage.	Capping layer has been designed to allow for surface water runoff, with slope grades of <1%.	
			Capping landform.	Capping layer has been re-profiled and is compatible with the local surrounding landscape.	
			<ul style="list-style-type: none"> Rehabilitated landforms will be designed to maximise surface water drainage to the natural environment and shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. Provide a self-sustaining land form post-mine closure. 	Drainage designs.	
		Landform drainage.		Reinstatement of natural drainage patterns (where possible).	
		Erosion control.		No tunnel erosion evident. No gully erosion evident. No rill erosion >200 mm deep and/or >200 mm wide. Appropriate erosion controls are in place and effective.	
		Reshape mine water dam.		Reshaping of mine water dams to their intended post-mining use has been completed.	
		<ul style="list-style-type: none"> Low exotic cover in rehabilitated Native Ecosystem. Reduce threats to rehabilitated Native Ecosystem area. 	Exotic cover.	Biometric monitoring confirms exotic cover < 10% in woodland rehabilitation areas. Non-native aggressive colonising grass and shrub species will be managed in adjacent pasture areas so they do not pose a threat to nearby woodland rehabilitation areas.	Monitoring in accordance with the BMP. Results of rehabilitation monitoring program.
			Feral animals.	Annual feral animal control program implemented. Feral animal monitoring confirms feral animal control program effective.	Management in accordance with the Bushfire Management Plan and Pest Control Program.
			Bushfire management.	Mitigation actions have been implemented as required by the Bushfire Management Plan.	Results of rehabilitation monitoring program.

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method																																																																																																		
Domain A: Native Ecosystem (Continued)	Domain 1: Infrastructure Area Domain 2: Tailings Storage Facility Domain 3: Water Management Area Domain 4: Overburden Emplacement Area Domain 8: Other (Rehabilitation) (Continued)	<ul style="list-style-type: none"> Woodland Areas established consistent with revegetation strategy and analogue vegetation communities. 	LFA.	<table border="1"> <thead> <tr> <th rowspan="2">Site Type</th> <th colspan="4">Relevant LFA Index Target Score</th> </tr> <tr> <th>LOI</th> <th>SI</th> <th>INFI</th> <th>NI</th> </tr> </thead> <tbody> <tr> <td>Woodland Rehabilitation</td> <td>>0.87</td> <td>>59</td> <td>>43</td> <td>>36</td> </tr> <tr> <td>Wambo Creek (Reference site: 14R)</td> <td>>0.84</td> <td>>62</td> <td>>41</td> <td>>37</td> </tr> </tbody> </table>	Site Type	Relevant LFA Index Target Score				LOI	SI	INFI	NI	Woodland Rehabilitation	>0.87	>59	>43	>36	Wambo Creek (Reference site: 14R)	>0.84	>62	>41	>37	Monitoring in accordance with the BMP. Results of rehabilitation monitoring program.																																																																															
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<small>NPS = Native Plant Species Richness, NOS = Native Over-storey Cover, NMS = Native Mid-storey Cover, NGCG = Native Ground Cover (grasses), NGCS = Native Ground Cover (shrubs), NGCO = Native Ground Cover (other), EPC = Exotic Plant Cover, OR = Overstorey Regeneration, HBT = Number of Trees with Hollows, FL = Total Length of Fallen Logs</small>																																																																																																							

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method													
Domain B: Agricultural - Grazing	Domain 1: Infrastructure Area Domain 4: Overburden Emplacement Area	<ul style="list-style-type: none"> All infrastructure is removed that is not required post closure. 	Removal of services.	All redundant services have been disconnected and removed.	Record of activities and statement of completion provided. Photographic record of decommissioned sites.													
			Removal of infrastructure.	All redundant infrastructure has been removed.														
		<ul style="list-style-type: none"> Soil properties are suitable for the establishment and maintenance of selected vegetation species. 	Material characterisation.	Material characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.	Managed in accordance with Topsoil Management Procedure. Record of activities and statement of completion provided.													
				Application of ameliorants.		Application of appropriate soil ameliorants applied has been completed.												
				pH.		Soil pH (H ₂ O) range: pH 5.5 – 7.8.												
				EC.		Soil EC (H ₂ O) ≤1200 microSiemens per centimetre (µS/cm).												
				Topsoil depth.		Topsoil has been applied at a minimum of approximately 100 mm thickness in all areas and/or otherwise been achieved with the addition of humus/compost material to form a topsoil/composite mix.												
				Topsoil characterisation.		Topsoil characterisation of the final land form surface (to identify appropriate soil ameliorants and application rates) has been completed.												
				Topsoil (Phosphorous).		<table border="1"> <thead> <tr> <th>Phosphate Test Method</th> <th>Productive Pasture</th> </tr> </thead> <tbody> <tr> <td>Colwell</td> <td>20 – 40 mg/kg</td> </tr> <tr> <td>Bray</td> <td>12 – 22 mg/kg</td> </tr> </tbody> </table>		Phosphate Test Method	Productive Pasture	Colwell	20 – 40 mg/kg	Bray	12 – 22 mg/kg					
						Phosphate Test Method	Productive Pasture											
						Colwell	20 – 40 mg/kg											
				Bray		12 – 22 mg/kg												
		mg/kg = milligrams per kilogram																
		Topsoil (Organic Carbon).	Organic Matter % (grams/100 grams) >3%.															
		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.															
		<ul style="list-style-type: none"> Rehabilitated landforms will be designed to maximise surface water drainage to the natural environment and shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. 	Erosion control.	No tunnel erosion evident. No gully erosion evident. No rill erosion >200 mm deep and/or >200 mm wide. Groundcover is >60%. Appropriate erosion controls are in place and effective.	Results of rehabilitation monitoring program.Final landform inspections. Photographic record.													
				<ul style="list-style-type: none"> Reduce threats to rehabilitated Agricultural (Grazing) area. 		Feral animals.	Annual feral animal control program implemented. Feral animal monitoring confirms feral animal control program effective.											
			Bushfire management.	Mitigation actions have been implemented as required by the Bushfire Management Plan.	Management in accordance with the Bushfire Management Plan and Pest Control Program. Results of rehabilitation monitoring program.													
		<ul style="list-style-type: none"> Pasture Areas established consistent with revegetation strategy and analogue vegetation communities. 	Landscape Function Analysis	<table border="1"> <thead> <tr> <th rowspan="2">Site Type</th> <th colspan="4">Relevant LFA Index Target Score</th> </tr> <tr> <th>LOI</th> <th>SI</th> <th>INFI</th> <th>NI</th> </tr> </thead> <tbody> <tr> <td>Pasture Rehabilitation</td> <td>>0.93</td> <td>>61</td> <td>>29</td> <td>>25</td> </tr> </tbody> </table>		Site Type	Relevant LFA Index Target Score				LOI	SI	INFI	NI	Pasture Rehabilitation	>0.93	>61	>29
Site Type	Relevant LFA Index Target Score																	
	LOI	SI	INFI	NI														
Pasture Rehabilitation	>0.93	>61	>29	>25														
LOI = Landscape Organisation Index, SI = Stability Index, INFI = Soil Infiltration, NI = Nutrient Cycling.																		

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method												
Domain B: Agricultural – Grazing	Domain 8: Other (Rehabilitation)	<ul style="list-style-type: none"> Reduce threats to rehabilitated Agricultural (Grazing) area. 	Feral animals.	Annual feral animal control program implemented. Feral animal monitoring confirms feral animal control program effective.	Management in accordance with the Bushfire Management Plan and Pest Control Program. Results of rehabilitation monitoring program.												
			Bushfire management.	Mitigation actions have been implemented as required by the Bushfire Management Plan.													
		<ul style="list-style-type: none"> Pasture Areas established consistent with revegetation strategy and analogue vegetation communities. 	Landscape Function Analysis	<table border="1"> <thead> <tr> <th rowspan="2">Site Type</th> <th colspan="4">Relevant LFA Index Target Score</th> </tr> <tr> <th>LOI</th> <th>SI</th> <th>INFI</th> <th>NI</th> </tr> </thead> <tbody> <tr> <td>Pasture Rehabilitation</td> <td>>0.93</td> <td>>61</td> <td>>29</td> <td>>25</td> </tr> </tbody> </table> LOI = Landscape Organisation Index, SI = Stability Index, INFI = Soil Infiltration, NI = Nutrient Cycling.	Site Type	Relevant LFA Index Target Score				LOI	SI	INFI	NI	Pasture Rehabilitation	>0.93	>61	>29
Site Type	Relevant LFA Index Target Score																
	LOI	SI	INFI	NI													
Pasture Rehabilitation	>0.93	>61	>29	>25													

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method												
Domain F: Water Management Areas	Domain 3: Water Management Area	<ul style="list-style-type: none"> All infrastructure is removed that is not required post closure. 	Removal of services.	All redundant services have been disconnected and removed.	Record of activities and statement of completion provided. Photographic record of decommissioned sites.												
			Removal of infrastructure.	All redundant infrastructure has been removed.													
		<ul style="list-style-type: none"> All watercourses subject to subsidence impacts shall be hydraulically and geomorphologically stable and have aquatic ecology and riparian vegetation that is the same or better than prior to commencement of mining. 	North Wambo Creek Diversion stability.	Watercourses affected by subsidence have been repaired and their functionality and stability have been confirmed by a hydrological engineer (or equivalent).	Hydrological engineer's report (or equivalent) provided.												
		<ul style="list-style-type: none"> Rehabilitated landforms will be designed to maximise surface water drainage to the natural environment and shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. 	Erosion control.	No tunnel erosion evident. No gully erosion evident. No rill erosion >200 mm deep and/or >200 mm wide. Appropriate erosion controls are in place and effective.	Results of rehabilitation monitoring program. Final landform inspections. Photographic record.												
		<ul style="list-style-type: none"> Water quality is non-polluting and appropriate for proposed final land use receiving waters 	Management of surface water.	Water discharged from diversion meets water quality trigger values for North Wambo Creek, as provided in the Water Management Plan.	Monitoring of water quality in accordance with Water Management Plan.												
<ul style="list-style-type: none"> North Wambo Creek Diversion vegetation established consistent with revegetation strategy and analogue vegetation communities. 	Landscape Function Analysis	<table border="1"> <thead> <tr> <th rowspan="2">Site Type</th> <th colspan="4">Relevant LFA Index Target Score</th> </tr> <tr> <th>LOI</th> <th>SI</th> <th>INFI</th> <th>NI</th> </tr> </thead> <tbody> <tr> <td>North Wambo Creek Diversion</td> <td>>0.84</td> <td>>62</td> <td>>41</td> <td>>37</td> </tr> </tbody> </table> LOI = Landscape Organisation Index, SI = Stability Index, INFI = Soil Infiltration, NI = Nutrient Cycling.	Site Type	Relevant LFA Index Target Score				LOI	SI	INFI	NI	North Wambo Creek Diversion	>0.84	>62	>41	>37	Monitoring in accordance with the North Wambo Creek Diversion Management Plan. Results of rehabilitation monitoring program.
Site Type	Relevant LFA Index Target Score																
	LOI	SI	INFI	NI													
North Wambo Creek Diversion	>0.84	>62	>41	>37													

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method
<p>Domain G: Water Storage (Excluding Final Void)</p> <p>Note: Water Storage (Excluding Final Void) to be retained as part of the final land use will be confirmed through consultation to be undertaken during final mine closure planning.</p>	<p>Domain 3: Water Management Area</p>	<ul style="list-style-type: none"> All hazardous materials and contaminated materials removed. 	Removal of contaminants.	Removal of contaminated sediments from mine water dams have been completed. Removal of contaminated sediments verified in land contamination technical specialist's reports.	Copies of assessments undertaken made available. Record of activities and statement of completion provided.
		<ul style="list-style-type: none"> All infrastructure removed that is not required post-closure. 	Removal of infrastructure.	All redundant infrastructure (including pumps, pontoons and pipelines) have been removed.	Record of activities and statement of completion provided. Photographic record of decommissioned sites.
			Removal of all services.	All redundant services have been disconnected and removed.	
		<ul style="list-style-type: none"> Water quality is non-polluting and appropriate for proposed final land use receiving waters. 	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 EPL 529 can be achieved.	Monitoring of water quality and quantity in accordance with WMP.
		<ul style="list-style-type: none"> Rehabilitated landforms will be designed to maximise surface water drainage to the natural environment and shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses. Provide a self-sustaining landform post mine closure. 	Dam reshaping.	Re-shaping dams (where required) in accordance with their intended use.	Photographic record. Record of activities and statement of completion provided. Record of pumping activities. Monitoring of water quality and quantity in accordance with WMP. Results of rehabilitation monitoring program. Final landform inspections.
Erosion control.	No tunnel erosion evident. No gully erosion evident. No rill erosion >200 millimetres (mm) deep and/or >200 mm wide. Appropriate erosion controls are in place and effective.		Results of rehabilitation monitoring program. Final landform inspections. Photographic record.		

Table 8: Proposed Rehabilitation Objectives and Completion Criteria (Continued)

Final Land Use Domain	Mining Domains	Rehabilitation Objectives	Indicator	Rehabilitation Completion Criteria	Justification or Validation Method
Domain 1: Infrastructure Note: Infrastructure to be retained as part of the final land use will be confirmed through consultation to be undertaken during final mine closure planning.	Domain 1: Infrastructure Area	<ul style="list-style-type: none"> All infrastructure retained that is required post-closure. 	Removal of services.	All redundant services (including electrical, water and communication services) have been disconnected and removed.	Record of activities and statement of completion provided. Photographic record of decommissioned sites.
			Removal of infrastructure.	All redundant infrastructure (including all buildings, fixed plant and other infrastructure with no beneficial use at mine closure) have been demolished and removed from site.	
			Removal of roads and car parks.	All roads and carparks (including hardstand areas and concrete footings) (with no beneficial use post-mining) have been decommissioned and removed from site.	
		<ul style="list-style-type: none"> All hazardous materials and contaminated materials removed. 	Removal of carbonaceous material.	All carbonaceous material on the surface have been removed and disposed on-site within appropriate coarse reject emplacement areas.	
			Removal of hazardous materials.	All hazardous materials have been classified in accordance with the EPA <i>Waste Classification Guidelines</i> , removed from site and disposed of at an appropriately licenced facility.	
			Removal of wastes.	All wastes generated during decommissioning have been classified in accordance with the EPA's <i>Waste Classification Guidelines</i> and removed from site.	
			Removal of hazards.	All potential hazards (e.g. electrical and mechanical) have been effectively isolated and secured.	
		Management of mine water.	All water discharged from site meets relevant volumes and quality as specified by EPL 529.	Monitoring of water quality and quantity in accordance with WMP.	
		Signs of spontaneous combustion.	No spontaneous combustion evident at mine closure and during decommissioning.	Monitoring for events in accordance with Spontaneous Combustion Management Plan.	
		<ul style="list-style-type: none"> All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community. 	Damage to access tracks have been repaired and stabilised.	Repairs complete.	Record of activities and statement of completion provided. Photographic record of repairs.
			Permits and approval documents issued.	Where applicable, necessary approvals are in place where buildings and infrastructure are to be retained as part of final land use.	Copy of any relevant approvals.
			Structural integrity of the infrastructure.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use.	Record of activities and statement of completion provided.
			Condition (e.g. structural, electrical, other hazards) of structure.	Formal acceptance from the subsequent landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner.
			Pipelines remaining underground.	The location of the infrastructure has been marked on a plan and registered with the relevant local authority (e.g. local Council) and Dial Before You Dig. Formal acceptance from the subsequent landowner that underground infrastructure has been left in a condition that is suitable for the intended final land use in accordance with formal agreement.	Supported by "as constructed" final landform plan. Copy of notification to local Council and Dial Before You Dig. Formal acceptance from landowner. Identified on an appropriate legal instrument associated with the land title.

4.2 STAKEHOLDER CONSULTATION

In accordance with the consultation requirements as set out in the RMP Form and Way Guidelines, WCPL consulted with the RR and Crown Land during the preparation of the Rehabilitation Objectives and Rehabilitation Completion Criteria. During this consultation, no comments on the Rehabilitation Objectives and Rehabilitation Completion Criteria were received.

As required by Condition B108, Schedule 2 of DA 305-7-2003, WCPL consulted with the RR, DPE, Department of Planning and Environment – Water Division (DPE-Water), BCD and SSC in 2020 during the preparation of the *Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023* (i.e. the previous RMP).

In accordance with Clause 9, Schedule 8a of the *Mining Regulation 2016*, this RMP has been prepared in a form as specified by the Secretary using the RMP Form and Way Guidelines (RR, 2021). A draft version of the RMP Form and Way Guidelines were issued in 2018 and were subsequently used for the preparation of the previous RMP and its rehabilitation objectives and completion criteria.

Accordingly, in accordance with Condition A24, Schedule 2 of DA 305-7-2003, WCPL sought the approval of the DPE to prepare this RMP without undertaking consultation with all parties required by Condition B108(b), Schedule 2 of DA 305-7-2003. DPE approved of this approach in correspondence dated 20 June 2022. A record of this correspondence is provided in **Attachment 2**.

A summary of the consultation completed for the *Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023* is provided in **Table 9**. Records of correspondence are provided in **Attachment 3**.

Table 9: Stakeholder Consultation for the Rehabilitation Management Plan

Stakeholder	Consultation Method	Matters Subject to Consultation	Response
DPE-Water	DPE – Major Projects Planning Portal Email then direct email	Version 0 provided to the DPE-Water 27 August 2020 for consultation. No comments were received.	N/A
BCD	Via the DPE – Major Projects Planning Portal	BCD provided comments on the MOP September 2019 to December 2020 requesting: <i>..that Table 28 and Table 29 include the minimum and maximum values measured in each zone as well as the average value.</i>	Minimum and maximum (range) values have been added to Table 27 and Table 30 (previously Tables 28 and 29).
		A copy of draft Version 0 of the RMP was provided to BCD 27 August 2020. Comments were received 20 October 2020.	A summary of the comments and how they have been addressed is provided in Attachment 3 .

Table 9: Stakeholder Consultation for the Rehabilitation Management Plan (Continued)

Stakeholder	Consultation Method	Matters Subject to Consultation	Response
SSC	Via the DPE – Major Projects Planning Portal	Version 0 provided to SSC 27 August 2020 for consultation. Comments were received 23 October 2020.	A summary of the comments and how they have been addressed is provided in Attachment 3 .
RR	Via the DPE – Major Projects Planning Portal	Copy of draft Version 0 was provided to the RR 27 August 2020 for consultation. No comments were received.	N/A
	Meetings	Meetings were held 14 October and 2 November 2020 (via video) with United, Wambo and the RR to discuss key changes in the RMPs and Rehabilitation Cost Estimate methodology for the two sites.	N/A
United (Glencore)	Meeting/Email	Internal discussions to ensure consistency between the Wambo United RMP and Wambo Coal Mine RMP documents.	N/A
DPE	Email	Copy of draft Version 0 was provided to the DPE for consultation via email on 27 August 2020. Comments were received on 20 November 2020.	Comments were addressed in Version 3 of the <i>Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023</i> and therefore have been addressed in this RMP.

4.2.1 Community Consultation

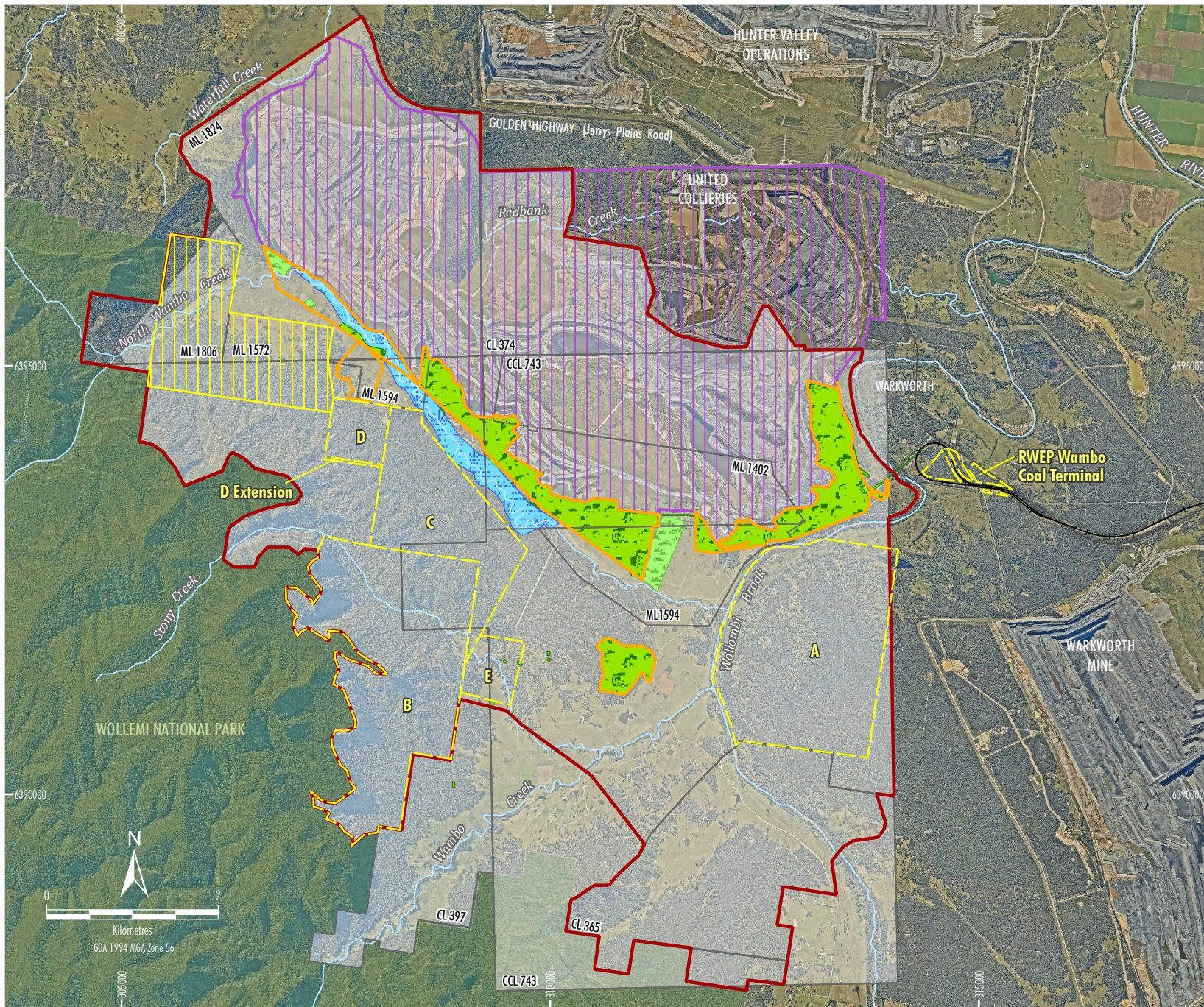
WCPL consults with the local community via the Community Consultative Committee (CCC). The CCC is made up of residents from the surrounding district, a representative of SSC and WCPL management. The CCC is chaired by an independent chairperson.

An overview of the RMP and the associated Rehabilitation Objectives and Rehabilitation Completion Criteria will be provided to the CCC at the next scheduled meeting (August 2022).

5 FINAL LANDFORM AND REHABILITATION PLAN

Final Land Use and Rehabilitation Plans have been prepared to show the proposed final land use (**Plan 1**) and final landform (**Plan 2**) at the end of the mine life. These plans are generally in accordance with the details of the Project EIS and subsequent assessments.

In accordance with Clause 12, Schedule 8A of the *Mining Regulation 2016*, the Wambo Final Land Use and Rehabilitation Plans have been submitted to the RR for approval. Following approval of the Final Land Use and Rehabilitation Plans, this RMP will be amended to substitute the proposed version (**Plans 1 and 2**) with the version approved by the RR in accordance with Clause 11, Schedule 8A of the *Mining Regulation 2016*.



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Biodiversity Offset Area under SSD 7142
 - Renmant Woodland Enhancement Program (RWE) Area
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Final Land Use Domain
 - Agricultural – Grazing
 - Native Ecosystem
 - Water Management Areas

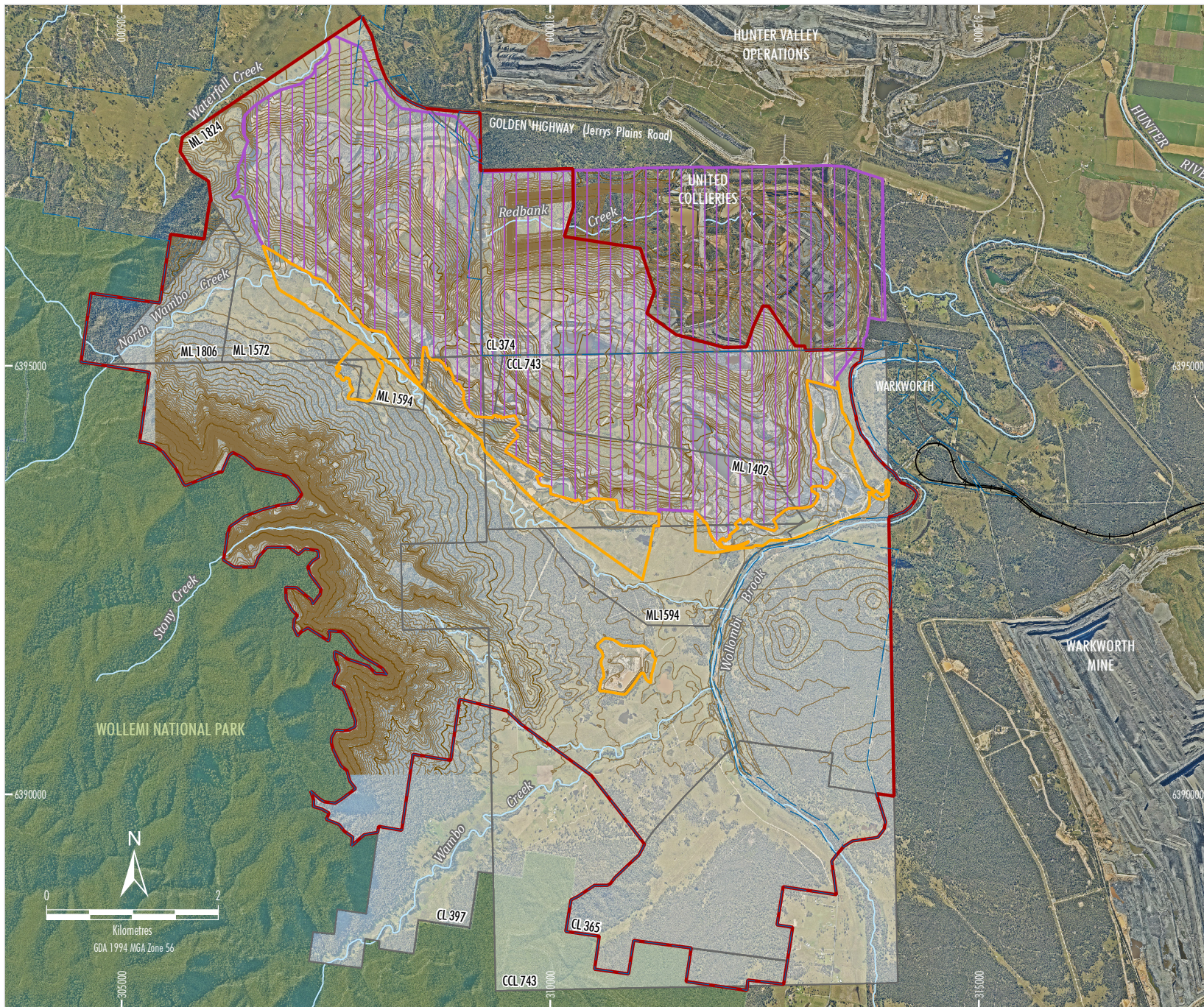
Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Colliers Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 05-10-2022

Peabody
WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

Final Land Use Domains and Landform Features



LEGEND

- Wambo Coal Mine Rail Spur and Loop
- National Park
- WCPL Owned Land
- Coal - Current Titles
- SSD 7142 Operational Area #
- Existing/Approved Wambo Coal Mine Surface Development Area
- Project Approval Boundary
- Index Contour (50 m Interval)
- Intermediate Contour (5 m Interval)

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022

Peabody
WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

Final Landform Contours

6 REHABILITATION IMPLEMENTATION

6.1 LIFE OF MINE REHABILITATION SCHEDULE

Areas that are disturbed by the Mine will be progressively rehabilitated following mining activities in accordance with Condition B107, Schedule 2 of DA 305-7-2003. Revegetation will be progressive, commencing soon after the completion of landform shaping.

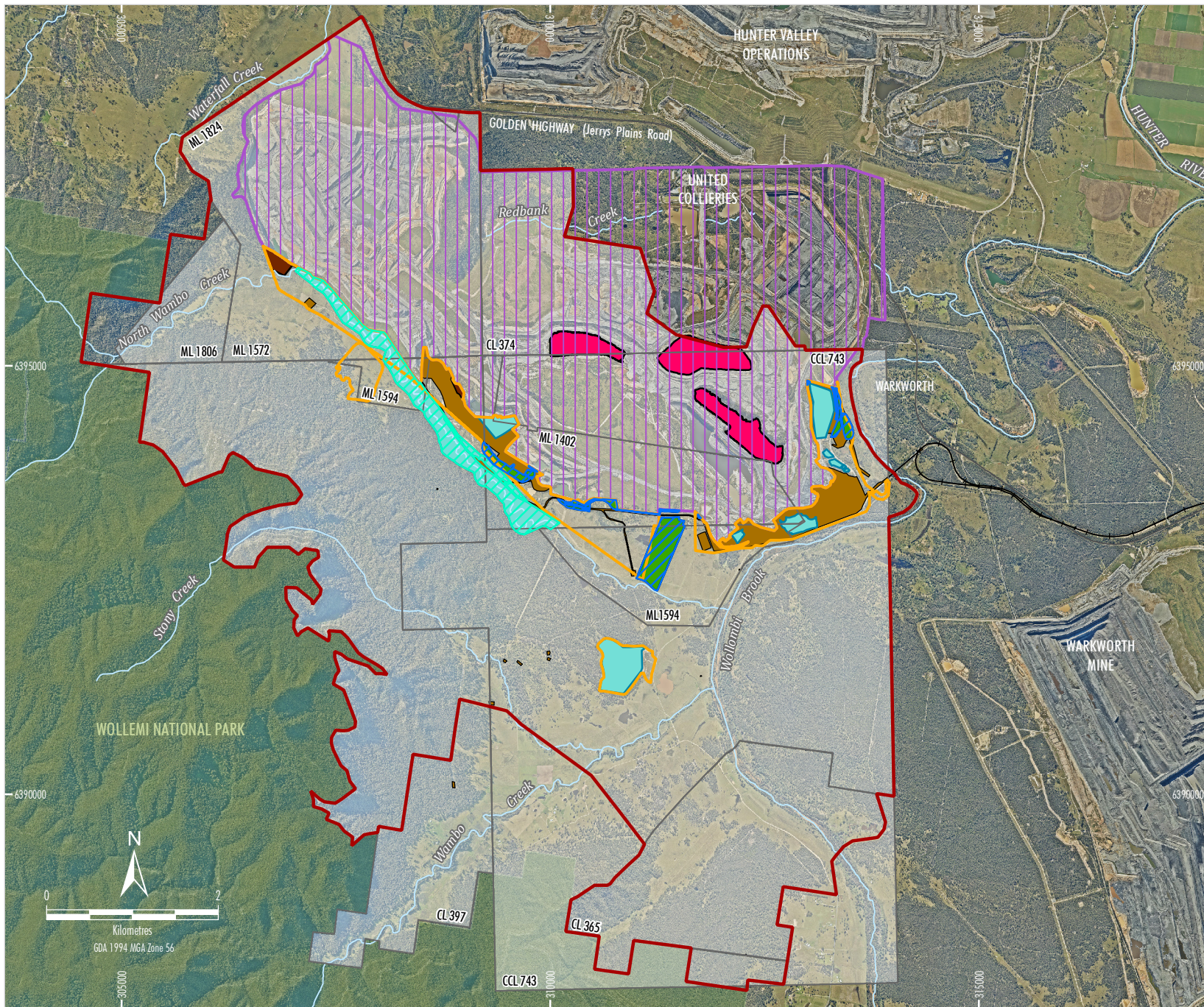
In previously rehabilitated areas, ongoing maintenance activities will include controlling weeds and pests, repairing landforms, re-seeding and application of maintenance fertilisers as required. The requirement of these activities will be based on the annual rehabilitation monitoring program (**Section 8**) and opportunistic inspections of rehabilitated areas.

In RWEF 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 (**Section 8**), opportunistic inspections and as required by the BMP.

Plans 3A to 3G outlines the proposed rehabilitation schedule over the life of the Mine, from the commencement of this RMP (i.e. 1 August 2022) until achievement of the rehabilitation completion criteria.

When developing the rehabilitation schedule, several assumptions were made, including:

- Mining infrastructure (e.g. CHPP, offices, access tracks, etc) will be required for the life of the underground mine (i.e. until 31 August 2042). As such, rehabilitation of the majority of surface disturbance areas will occur following mine closure.
- Infrastructure Area and Water Management Area Mining Domains to be retained as part of the final land use will be confirmed through consultation to be undertaken during final mine closure planning.
- Access tracks on existing pasture land will be rehabilitated to an Agricultural - Grazing final land use.
- Access tracks on existing woodland areas will be rehabilitated to a Native Ecosystem final land use.
- Rehabilitation of subsidence impacts in underground mining areas (SMP) will be undertaken on a case-by-case basis to match the existing environment.
- The NWC Diversion will be progressively rehabilitated with riparian vegetation and woodland species in accordance with the revegetation strategy described in the North Wambo Creek Diversion Management Plan.



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Mining Domain Types**
 - Infrastructure Area
 - Tailings Storage Facility
 - Overburden Emplacement Area
 - Other (Rehabilitation)
 - Water Management Area
 - Rehabilitation Phase**
 - Growth Medium Development
 - Ecosystem and Land Use Development

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

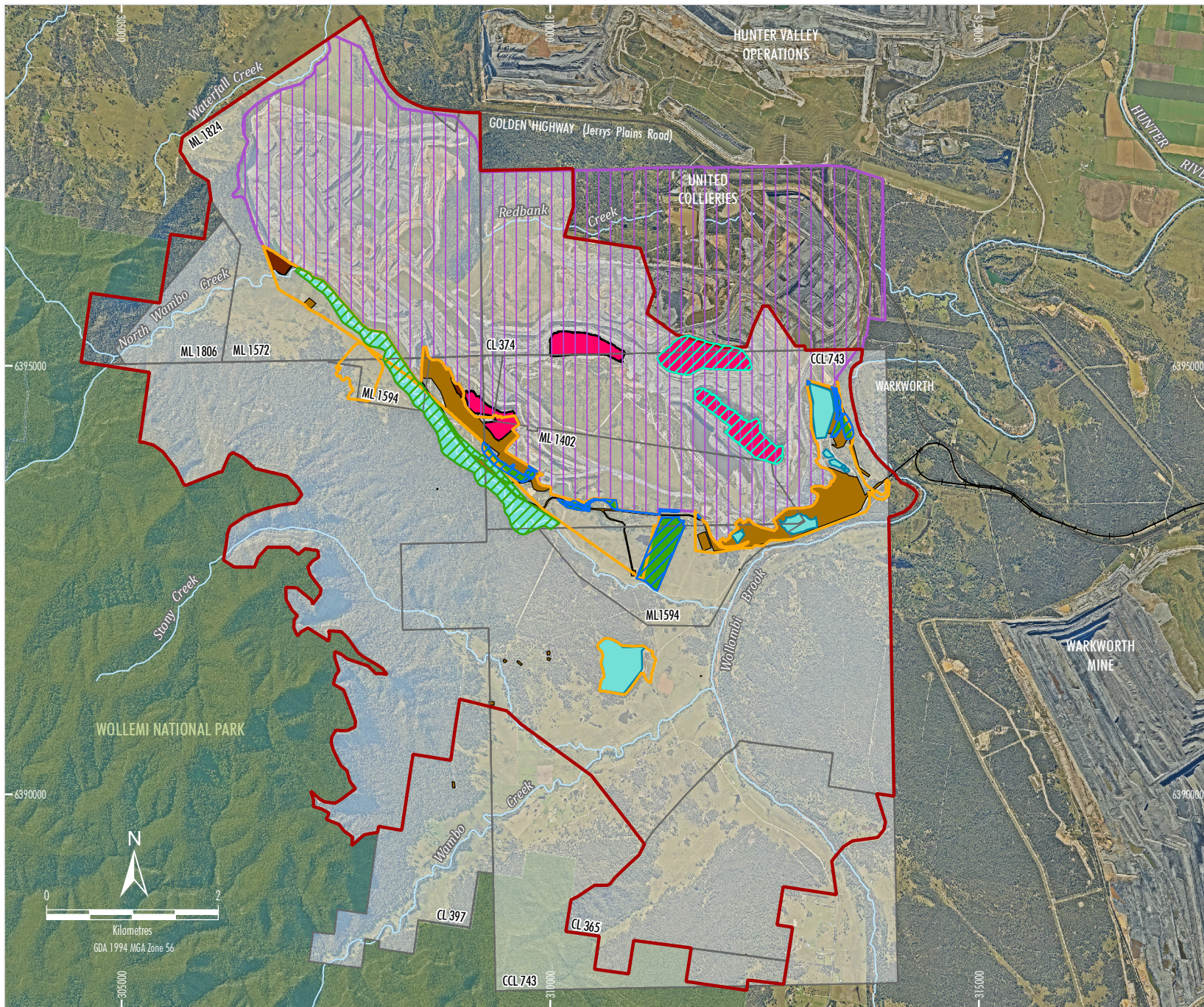
Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

**Life of Mine Rehabilitation Schedule
 (Year 2022)**



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Mining Domain Types**
 - Infrastructure Area
 - Tailings Storage Facility
 - Overburden Emplacement Area
 - Other (Rehabilitation)
 - Water Management Area
 - Rehabilitation Phase**
 - Growth Medium Development
 - Ecosystem and Land Use Establishment
 - Ecosystem and Land Use Development

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

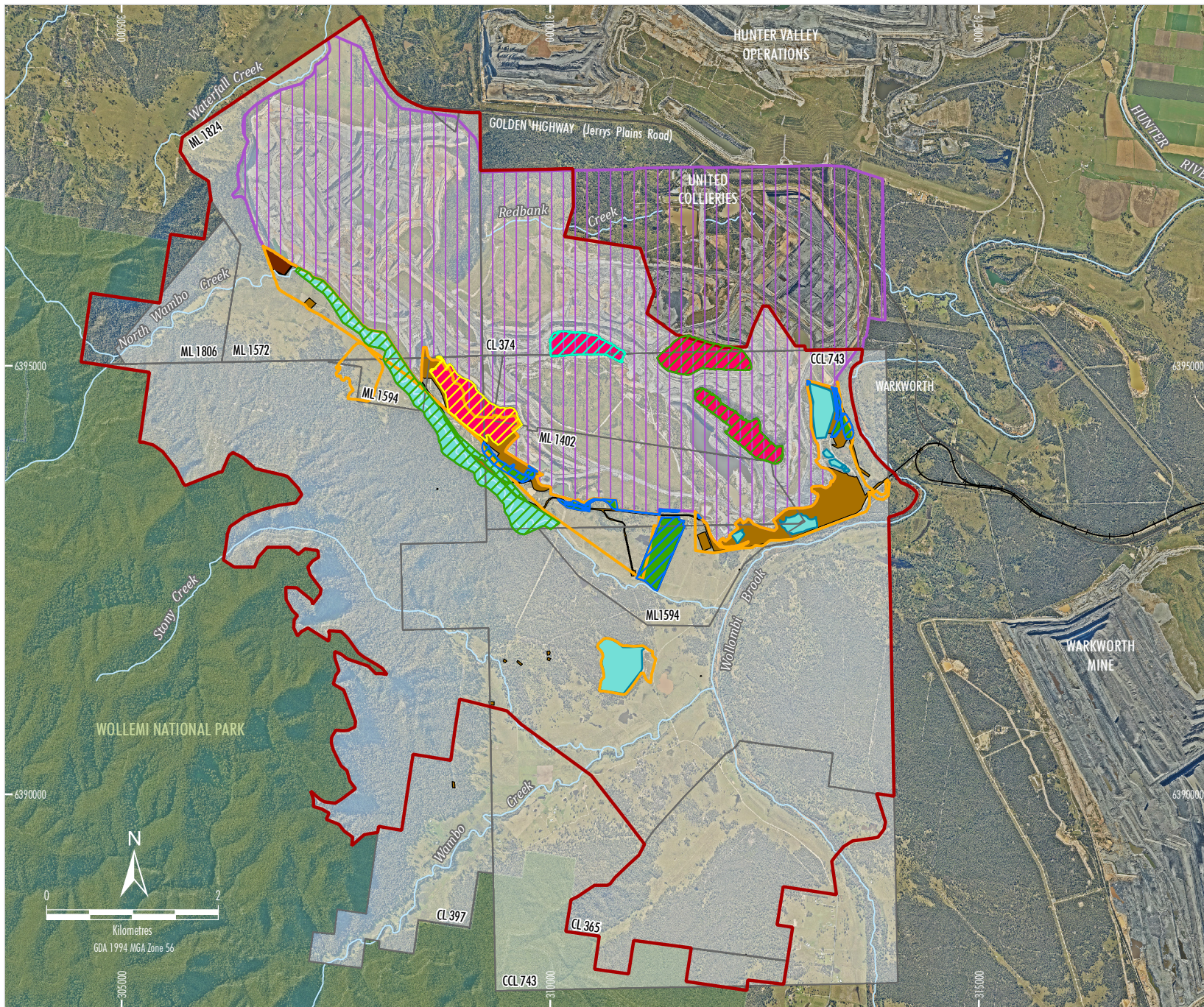
Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

**Life of Mine Rehabilitation Schedule
 (Year 2027)**



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Mining Domain Types**
 - Infrastructure Area
 - Tailings Storage Facility
 - Overburden Emplacement Area
 - Other (Rehabilitation)
 - Water Management Area
 - Rehabilitation Phase**
 - Landform Establishment
 - Growth Medium Development
 - Ecosystem and Land Use Establishment
 - Ecosystem and Land Use Development

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

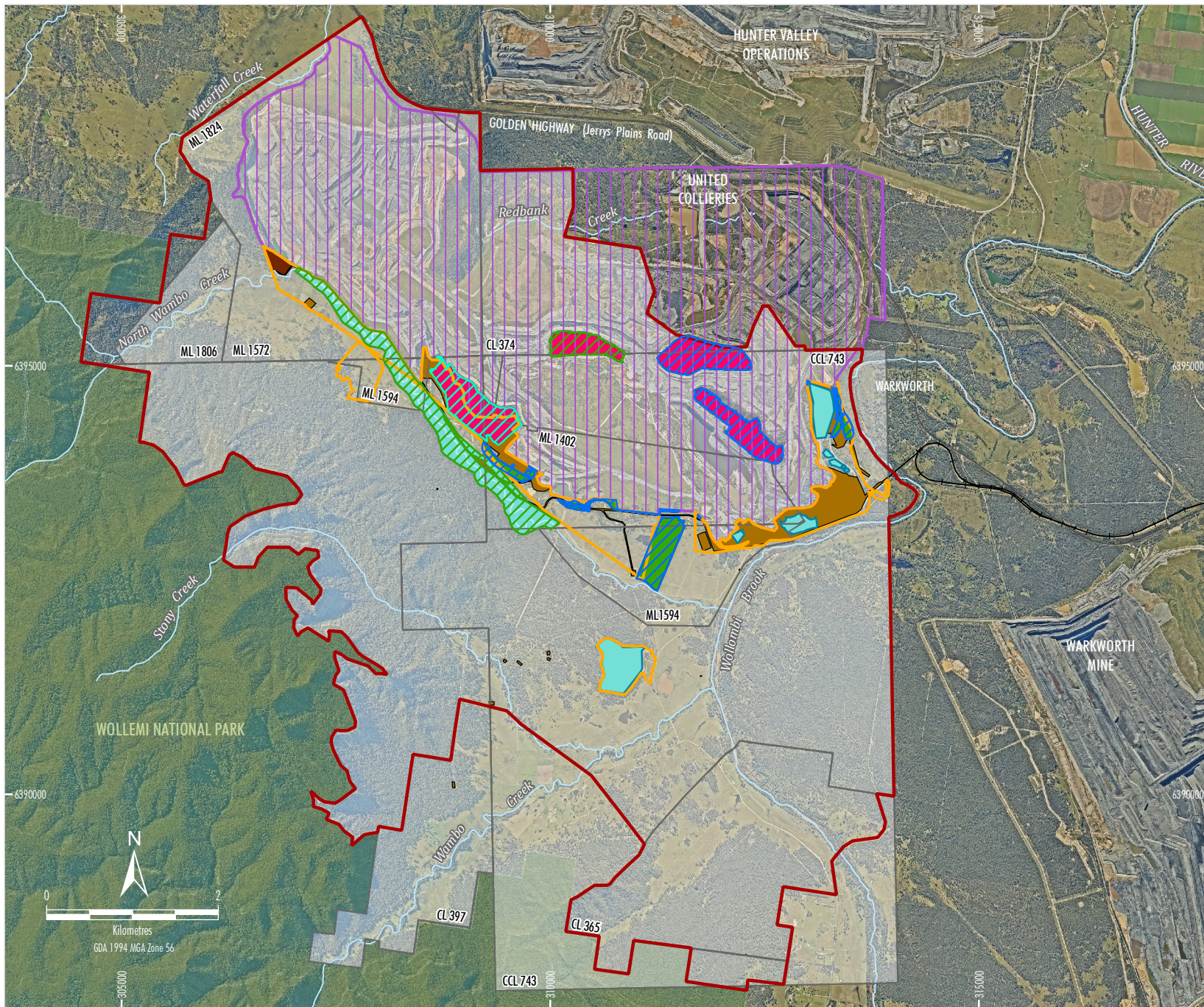
Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

**Life of Mine Rehabilitation Schedule
 (Year 2032)**



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Mining Domain Types**
 - Infrastructure Area
 - Tailings Storage Facility
 - Overburden Emplacement Area
 - Other (Rehabilitation)
 - Water Management Area
 - Rehabilitation Phase**
 - Growth Medium Development
 - Ecosystem and Land Use Establishment
 - Ecosystem and Land Use Development
- # Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

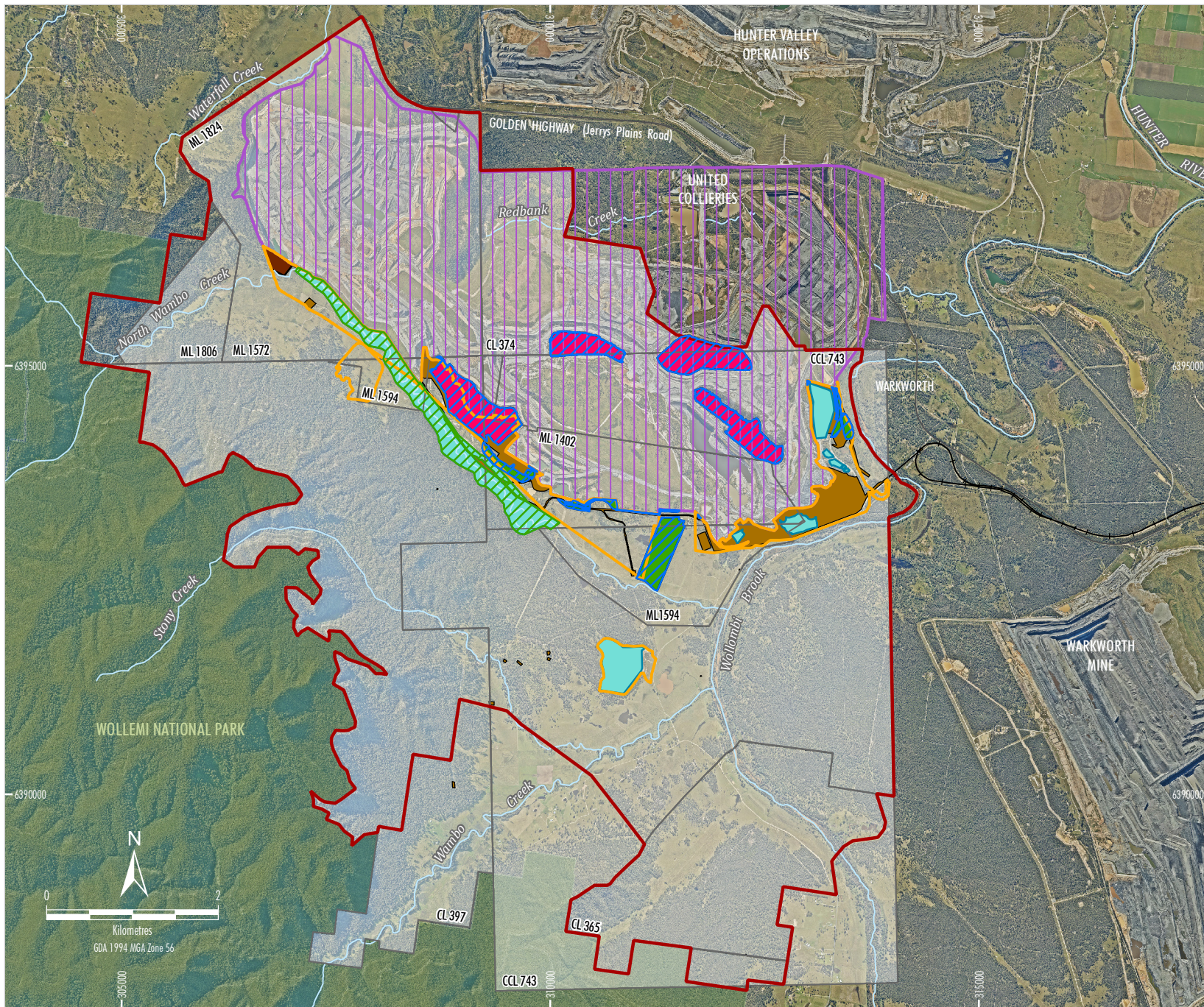
Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

Life of Mine Rehabilitation Schedule
(Year 2037)

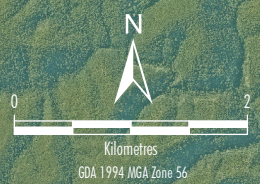


- LEGEND**
- +— Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Mining Domain Types**
 - Infrastructure Area
 - Tailings Storage Facility
 - Overburden Emplacement Area
 - Other (Rehabilitation)
 - Water Management Area
 - Rehabilitation Phase**
 - Ecosystem and Land Use Establishment
 - Ecosystem and Land Use Development

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

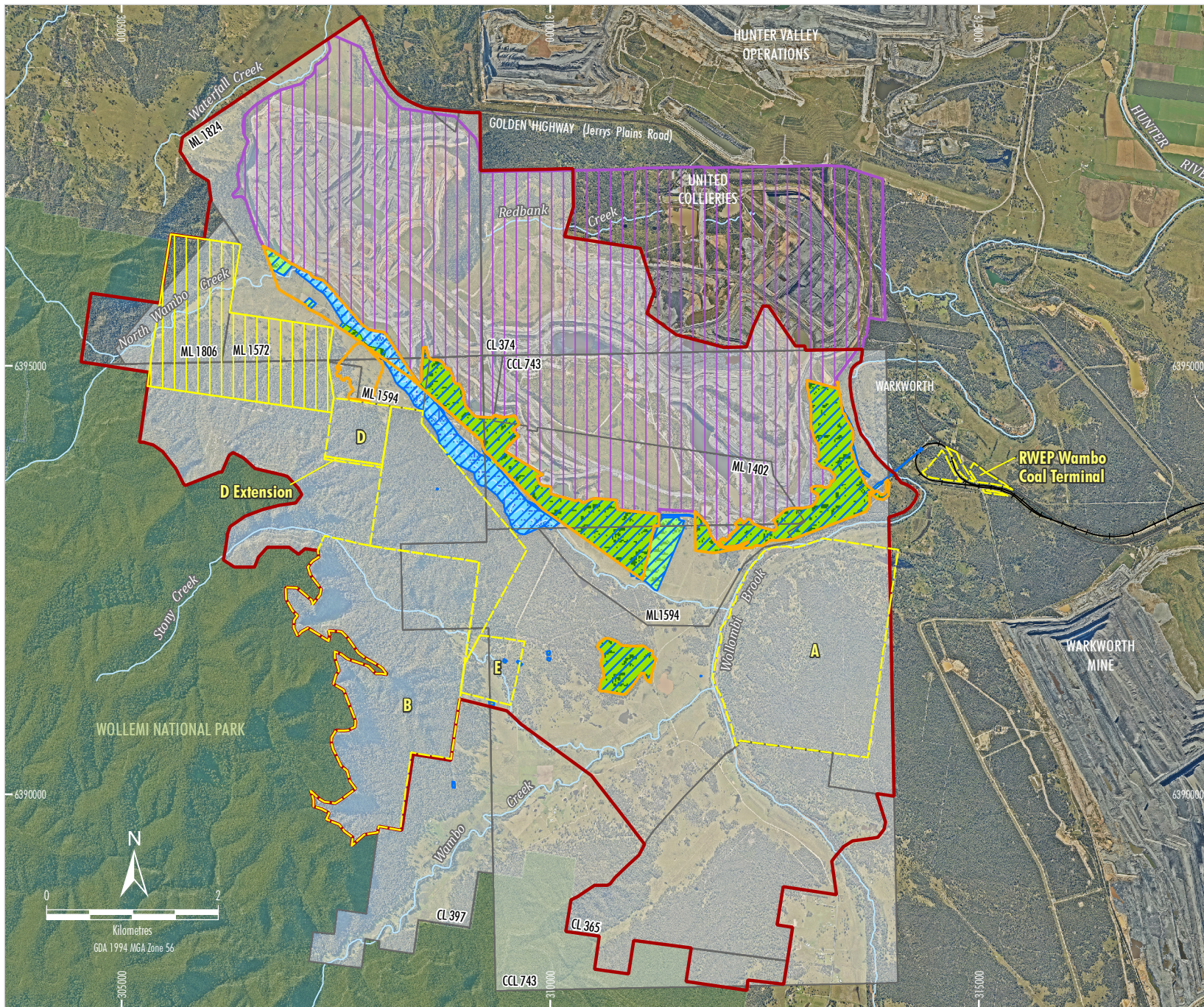
Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

**Life of Mine Rehabilitation Schedule
 (Year 2042)**



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Biodiversity Offset Area under SSD 7142
 - Remnant Woodland Enhancement Program (RWEPP) Area
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Final Land Use Domain
 - Agricultural – Grazing
 - Native Ecosystem
 - Water Management Areas
 - Rehabilitation Phase
 - Ecosystem and Land Use Development

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

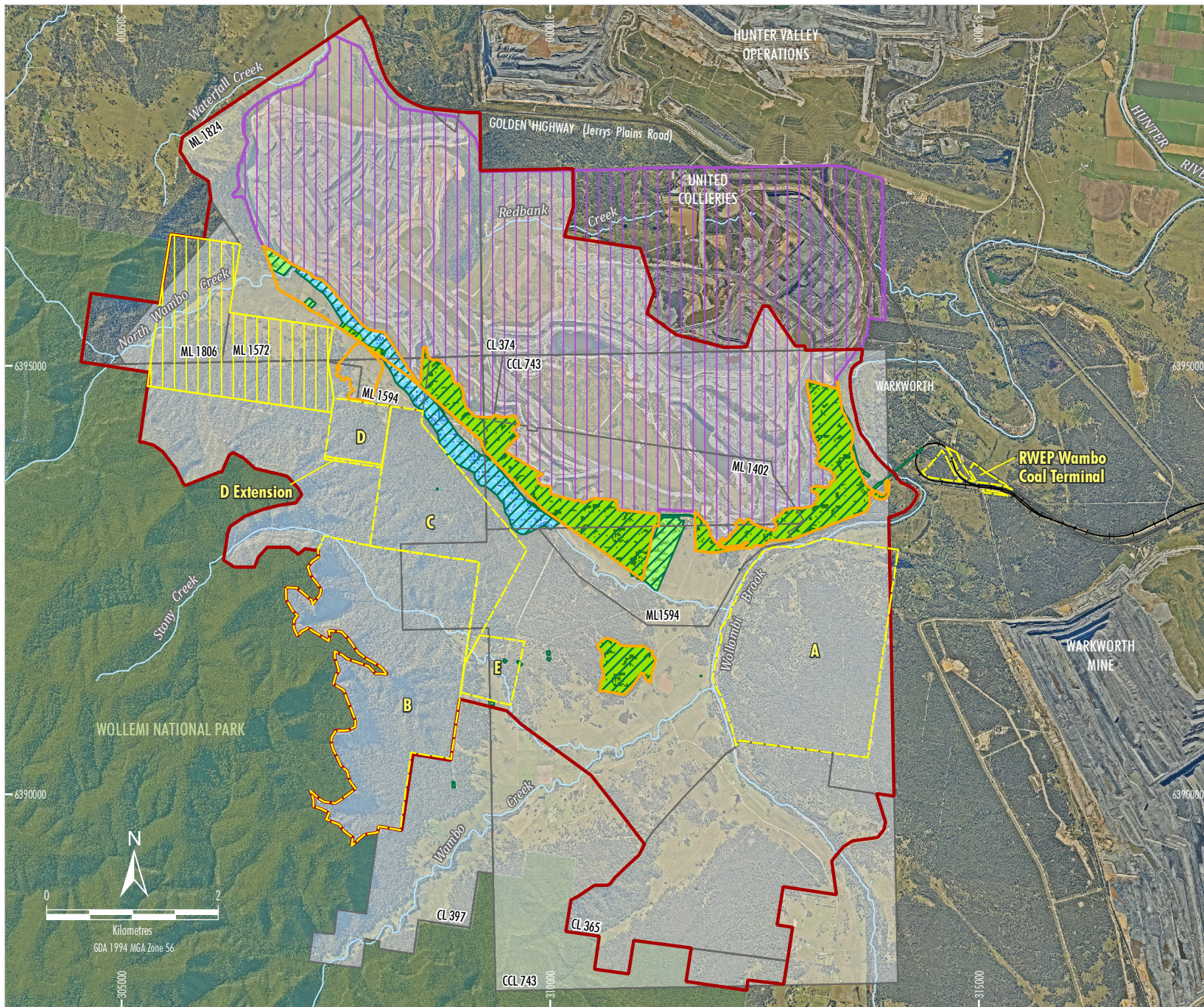
Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 05-10-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

**Life of Mine Rehabilitation Schedule
 (Year 2047)**



- LEGEND**
- Wambo Coal Mine Rail Spur and Loop
 - National Park
 - Coal - Current Titles
 - SSD 7142 Operational Area #
 - Biodiversity Offset Area under SSD 7142
 - Remnant Woodland Enhancement Program (RWEPP) Area
 - Existing/Approved Wambo Coal Mine Surface Development Area
 - Project Approval Boundary
 - Final Land Use Domain
 - Agricultural – Grazing
 - Native Ecosystem
 - Water Management Areas
 - Rehabilitation Phase
 - Rehabilitation Completion (Sign-off)

Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020), this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project.

Source: WCPL (2022); NSW Spatial Services (2022)
 Orthophoto: WCPL (May 2022)

Date prepared: 29-07-2022



**WAMBO COAL MINE
 REHABILITATION MANAGEMENT PLAN 2022**

**Life of Mine Rehabilitation Schedule
 (Year 2052)**

6.2 PHASES OF REHABILITATION AND GENERAL METHODOLOGIES

6.2.1 Active Mining Phase

Topsoil Resource

Soil landscapes in the vicinity of the Mine 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 (WCPL, 2003). 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 the Mine, as identified in the Project 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 gravelly soils generally occurring on upper slope and hill top areas. No depth of the profile is suitable for topsoil.
- Alluvials – found around NWC. The depth suitable for topsoil recovery is highly variable, ranging from 0.30 m to limited areas of 1.0 m depth.

Table 10 provides a summary of the soil resource strategies undertaken at 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.

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 to be applied (e.g. use of fertilisers). 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.

A Topsoil Stripping Permit must be completed and signed off by the Manager: Environment and Community. The Topsoil Stripping Permit is to be completed by a member of the Environmental Department and the topsoil stripping supervisor during a site inspection. During this inspection, soil types will be identified, with the supervisor briefed on the target soil horizon to be stripped as well as the stripping depth for varying soils.

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

Table 10: 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 Project EIS: <ul style="list-style-type: none"> - Red Podzolic (100 mm). - Yellow Podzolic (200 mm). - Alluvial (300 mm). • Topsoil will be placed directly onto reshaped areas where possible. 	<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 disturbance 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 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; - 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; and - sign posted to clearly identify topsoil stockpile areas.

¹ Subject to quantification of soils.

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 for the transport of soil material.
- 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 Environmental 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 1 m deep. Where the stockpiling duration 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 the stockpiled location and transported to the final destination should also be considered.
- Stockpiles should:
 - not be placed on excessively steep landforms, 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 from the 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 a 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 the same vicinity.
- Preferably, topsoil stockpiles shall be no greater than 3 m 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 to provide sufficient erosion control, weed suppression and promote biological activity in the stockpiled soil.
- Sterile cover crop species should be selected in consideration of secondary pasture/woodland species.

Maintenance of Existing Stockpiles

- Vegetation establishment will be regularly monitored for the first three months (or until a cover crop has been 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-sown with a protective cover crop. Those stockpiles will also need to be ear-marked for re-survey as part of the annual topsoil survey.
 - For long-term stockpiles, 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.
- 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-tined 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 to 10 tonnes per hectare (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.

Flora and Fauna

WCPL have developed a detailed management strategy which identifies the short, medium and long term measures to be undertaken to manage vegetation and fauna habitat at the site. The management strategy aligns to the requirements of WCPL's Conservation Agreements for the Remnant Woodland Enhancement Areas (RWEAs). The management strategy includes measures for weed and pest control, fire hazard reduction burns, vehicle access, fencing and annual reporting on the monitoring program.

The management strategy is included in the BMP, and an overview of the key management strategies is provided below.

Surface Disturbance Permit

WCPL has implemented a Surface Disturbance Permit (SDP) procedure and checklist. The SDP is implemented and approved by WCPL's Environmental Department prior to any land disturbance activities on undisturbed or rehabilitated land taking place. The SDP applies to WCPL-owned land, mining leases and privately owned land where an agreement with the landowner is in place.

The SDP aims to identify and manage any environmental restraints such as cultural heritage sites, flora and fauna communities, surface drainage, threatened species and permitting required prior to disturbance. Examples of management measures are:

- Erosion and sediment controls.
- Cultural heritage salvage.

- Disturbance delineation.
- Timing of activities.

WCPL manages the SDP procedure in accordance with the BMP and generally in accordance with the activities approved by the Development Consent (DA 305-7-2003).

Vegetation and Burrow Clearance Protocol

A Vegetation and Burrow Clearance Protocol has been developed to minimise impacts on both non-threatened and threatened flora and fauna (as listed under the *Biodiversity Conservation Act 2000* or the *Environment Protection and Biodiversity Conservation Act 1999*). The Vegetation and Burrow Clearance Protocol is applicable across all WCPL managed land. The key components of the Vegetation and Burrow Clearance Protocol are:

- Delineation of disturbance areas.
- Pre-clearance surveys.
- Clearing process and fauna management strategies:
 - vegetation clearing; and
 - wombat burrow clearing.
- Habitat feature salvage.

Procedures in relation to the salvage of Aboriginal sites prior to vegetation clearance are detailed in the *Wambo Development Project – Aboriginal Heritage Research Design and Study Plan (incorporating Salvage Programme)* (Navin Officer Heritage Consultants, 2005).

Threatened Species Management Protocol

A Threatened Species Management Protocol 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 Threatened Species Management Protocol are:

- Site observations/surveys.
- Threatened species management strategies, including:
 - avoiding RWEAs;
 - threat abatement;
 - capture and release;
 - relocation; and
 - reuse and provision of habitat resources.
- Consulting and reporting.

Seed Collection and Propagation

WCPL has implemented a native seed collection and propagation program, to ensure that the genetic integrity, structure and composition of local vegetation types are maintained.

The collection of locally sourced native seed will be carried out annually by a licensed provider with the Florabank guidelines (Florabank, 1999 and 2000) used to guide the seed collection process.

The seed collection program will take into account seasonality of seed availability and the specific target seed lists required to establish the various vegetation classes onsite.

Weed Management

WCPL's weed management program utilises an adaptive management approach with an overarching weed treatment plan which is updated annually. The annual weed treatment plan is updated based on the management actions undertaken and results of monitoring and inspections from the previous year. The key aspects of the program include:

- Weed control activities undertaken by a qualified and experienced bush regeneration contractor in accordance with the annual weed treatment plan.
- Annual inspections and floristic monitoring of the RWEAs and Revegetation Areas during biodiversity monitoring.
- An annual weed survey (if required).
- An annual weed management report documenting the weed control activities undertaken during that year, prepared by a qualified bush regeneration contractor.
- Updates to the annual weed treatment plan based on the results of monitoring, inspections and surveys.

Treatment of all weeds will be undertaken by suitably qualified and experienced personnel.

Assisted Natural Regeneration

Natural regeneration is reliant upon seedlings germinating from seed naturally distributed from existing remnant vegetation. This approach will be utilised in areas where there is a viable seed bank of native species present within the topsoil of cleared areas.

Direct Seeding

Direct seeding will be utilised on freshly shaped or existing rehabilitation areas that are not believed to have an adequate natural seed bank within disturbed topsoil to meet LFA completion criteria.

Application of seed by hand or machinery will follow preparation of the surface which may consist of scarification and ameliorates to allow successful establishment of applied seed.

Tubestock Planting

Tubestock planting will be utilised where it is considered natural regeneration of native species is unlikely to occur in a timely manner. This will be determined on a case by case basis. Species composition and rates for tubestock planting will be reflective of the adjacent and pre-clearing vegetation community type with seedlings propagated from local provenance seed stock where possible.

Grazing and Stock Management

Domestic stock may be introduced to rehabilitation areas dependent on future monitoring results showing achievement of relevant completion criteria. In this instance, ongoing monitoring and management will occur to ensure sustainable grazing practices are implemented.

The following mitigation measures will be undertaken to manage the impacts of grazing by domestic stock:

- Stock grazing will not be undertaken in areas of high biodiversity value.
- Where livestock are being used to remove vegetation by crash grazing, the following principles will be considered:
 - allow the stock to feed intensively in a defined area only for short periods;
 - undertake crash grazing between autumn and mid-spring;
 - manage the movement of livestock using fencing (temporary or permanent); and
 - monitor feed levels so that overgrazing does not occur.
- Where possible ground cover will be maintained towards 100 %.
- The grazing pressure from other herbivores (e.g. kangaroos, wallabies, rabbits and hares) is to be reviewed in the context of the domestic stocking rate that can be utilised.

Fencing

Boundary fence integrity will be inspected during a fenceline audit completed every three years. Periodic fence line inspections will continue and maintenance will be conducted as required.

New fencing erected within or on the boundary (including repairs to existing fence lines where required) of the RWEAs or revegetation areas will use post and two or three strand non-barbed (plain) wire only. If required, boundary fences to these areas may use a top barbed wire (or electric fencing) to protect the fence from neighbouring grazing cattle.

In order to reduce the risk of injury to native fauna, existing fencing within the boundaries of the Final Land Use Domains will be removed in areas where it is providing no benefit to revegetation outcomes.

Habitat Augmentation

Habitat augmentation involves the establishment of habitat structures within Management Domains (as described in the BMP). This includes the relocation of surplus trees and rocks removed from the Mine footprint for relocation as habitat structures within the Management Domains.

Procedures and recording requirements will be developed for the re-establishment of logs and rock within Management Domains.

Vertebrate Pest Management

A variety of vertebrate pest species have been identified within WCPL's RWEAs and rehabilitation areas. These have primarily consisted of feral pigs, rabbits, foxes and dogs.

The WCPL-operated pest control program, is complemented by a year-round agister-managed pest control program. The agister-managed program primarily targets feral pigs on grazing and buffer lands surrounding the Mine.

The agister-managed utilises remote trail cameras to monitor the movement of pest species. Humane trapping and shooting practices are employed to capture and euthanize targeted feral species.

Nest Boxes

In response to recommendations made in the 2015 Independent Environmental Audit (Umwelt, 2015), a total of 50 nest boxes were installed across five locations across the Mine site in December 2018.

Nest boxes will be monitored every second year to record data on their usage and identify any maintenance required to ensure they continue to provide potential habitat.

Waste Management

Waste management at the Mine is undertaken by a licensed waste management company under the basic principles of the Total Waste Management System. Significant benefits of the Total Waste Management System include:

- segregation of waste at the source;
- expansion of recycling capabilities;
- reduction in the risk of contaminating non-hazardous waste;
- comprehensive monthly reports detailing volumes, recycling, disposal and transportation of waste; and
- improved data capture to increase efficiency and accuracy when reporting.

Routine inspections of the RWEAs and revegetation areas will include monitoring of potential waste management issues, including illegal dumping of waste, and removal of waste if/when required. To date, there have been no issues with illegal waste dumping.

Ore Beneficiation Waste Management (Rejects and Tailings Disposal)

ROM coal is crushed and washed in the CHPP which operates at a rate of up to approximately 1,800 tonnes per hour of ROM coal feed. A product coal stockpile with an approximate capacity of 500,000 tonnes (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.

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

Coarse reject material is produced by the CHPP as a result of washing of United Wambo Joint Venture (UWJV) open cut and Wambo underground ROM coal and primarily comprises minor quantities of coal as well as sandstone, siltstones, shales, conglomerates and mudstone (as predominantly gravel and cobble sized fragments). It is hauled back to the UWJV open cut mining operation and is dispersed throughout the mine waste rock emplacements to manage its geochemical characteristics.

Further detail on the management of coarse rejects is provided in the United Phase 2 RMP.

Approximately 80-85% of the CHPP reject is in the form of coarse reject. The remainder is fine reject (tailings). The tailings are a slurry with 18 to 20% solids, the solids comprising very fine stone and clay material. Approximately 24.5 Mt of tailings (dry basis) are expected to be produced over the life of the Mine (WCPL, 2017). The tailings management procedures developed for the Mine to address the physical characteristics of tailings generated to date will continue until mine closure.

Tailings are pumped as a 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 disposal in the North East Tailings Dam ceased in 2004. Active tailings disposal is currently being undertaken in the Homestead In-Pit Tailings Dam and the Hunter Pit Tailings Dam.

Commencing in 2024, tailings will be disposed in the South Bates Sump Tailings Dam.

Once tailings disposal areas have reached capacity and have been 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 2 m (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 waste 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 storage facility will occur when the dams have been capped and deemed stable and suitable for rehabilitation to occur.

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 approval.

Rock/Overburden Emplacement

No rock/overburden management will be undertaken by WCPL during Phase 2 operations at the Mine. Refer to United Phase 2 Rehabilitation Management Plan for a description of the proposed activities.

Geology and Geochemistry

The Mine 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 Wittingham Coal Measures are divided into the Jerrys Plains Subgroup, Vane Subgroup, Denman Formation and Archerfield Sandstone. The upper part of the Wittingham Coal Measures, the Jerrys Plains Subgroup, contains some 15 formally named coal seams. Seam structure is relatively simple with the seams dipping gently to the south-west at approximately 2-3°. 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 completed NWU Mine.

Extraction occurs in the Whybrow, Wambo, Woodlands Hill and Arrowfield Seams.

The waste rock materials generated by the Mine are typically alkaline and slightly sodic which are common geochemical characteristics of coal mine waste rock material in the Hunter Valley. If inappropriately managed, the sodicity of the 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.

Appropriate application of ameliorants will be undertaken 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. 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.

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 the Mine 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 the Mine have historically been rare and associated with heating events in long term coal stockpiles.

In consideration of the above, the risk to rehabilitation as a direct result of possible spontaneous combustion events is considered low to medium at the Mine.

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

Details of spontaneous combustion management for the open cut operation are provided in the United Phase 2 Rehabilitation Management Plan.

Material Prone to Generating 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 potential and element leaching (WCPL, 2003). 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 (WCPL, 2003). Therefore, the risk to rehabilitation, as a direct result of possible AMD events, is considered low at the Mine.

Coal reject samples (coarse reject and tailings) taken from the CHPP were classified as indeterminate and potentially acid forming, 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 NAF waste rock.

Characterisation of soil and waste rock material during future mine planning phases will be undertaken by United. Further details are provided in the United Phase 2 Rehabilitation Management Plan.

WCPL routinely monitors surface water quality, groundwater quality and rehabilitation aspects to track the water levels, 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 returns a pH range between pH 8 and pH 9.

Erosion and Sediment Control

An Erosion and Sediment Control Plan (ESCP) has been developed to satisfy Condition B66, Schedule 2 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 disturbed areas.
- 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.
- A program to monitor the effectiveness of control measures.

The ESCP will be reviewed as required by DA 305-7-2003 and in consultation with the relevant authorities and updated where necessary. The following control measures are identified in the ESCP for land disturbance, land rehabilitation, topsoil management and monitoring:

- Subsidence Management:
 - Regular monitoring for surface cracking and ponding sites is carried out in accordance with the relevant Extraction Plan(s). 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 required by the ESCP, appropriate sediment controls must be in place during any repair works until the area is considered suitably stable.
- Land Disturbance:
 - Land disturbance will be minimised and limited to those areas outlined in this RMP. Prior to any disturbance of land, a SDP must be completed by the operational manager (or delegate), in consultation with the Environmental Department.
 - The SDP 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.
- Topsoil Management:
 - Topsoil will be stripped and handled in accordance with the requirements of the SDP and Topsoil Management Procedure. 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 the Topsoil Management Procedure.
- Inspections and Monitoring:
 - Sediment control structures and tailings dams under WCPL control 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).

Ongoing Management of Biological Resources for Use in Rehabilitation

Materials from areas disturbed under this consent (including topsoils [discussed in detail above], substrates and seeds) are to be recovered, managed and used as rehabilitation resources, to the greatest extent practicable. Where practicable, clearing operations will be managed to maximise the reuse 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.

Mine Subsidence

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 (May 2022) 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, are provided in *Extraction Plan - South Bates (Whybrow Seam) Underground Mine Longwalls 11 to 16*.

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 SBUE Mine, are provided in *Extraction Plan - South Bates (Whybrow Seam) Underground Mine Longwalls 17 to 20* and in *Extraction Plan - South Bates (Whybrow Seam) Underground Mine Longwalls 21 to 24*.

The remediation measures and implementation of additional measures if required, regarding subsidence impacts on sections of the NWC Diversion, are outlined in the approved *Extraction Plan - South Bates Underground Mine Longwalls 11 to 16* and *Extraction Plan - South Bates (Whybrow Seam) Underground Mine Longwalls 17 to 20*. All subsidence remediation measures to be undertaken by WCPL, in regards to the NWC Diversion, will be in consultation with the RR.

Historical Subsidence

In February 2018, a Section 240 Notice was issued to WCPL by the RR to prepare a Subsidence Remediation Plan (SRP) for impacted areas of the neighbouring “Kharlibe” property. The property was undermined between 1991 and 2000 as part of the Homestead Underground Mine, within CL397 and CCL743. A second Section 240 Notice was issued by the RR on 19 September 2019, requiring WCPL to implement subsidence remediation works and associated works in accordance with the SRP and to provide quarterly Subsidence Remediation Reports.

To date, the following works have been undertaken:

- Phase 1 remediation works undertaken in May 2019 which included an isolated sinkhole, a close spaced row of sink holes and five small depressions.
- Phase 2 remediation works were undertaken from 17 – 21 June 2019 as they were considered high priority works. These works included the remediation of 20 sites as outlined in Appendix E of the SRP.
- Phase 3 remediation works undertaken from 15 July – 20 December 2019 which included landform design and remediation works at 51 sites.
- Remediation of Stony Creek was undertaken in March 2020.
- Additional Phase 4 works were undertaken across the Kharlibe property within Stony Creek (Site 99) between 3 – 24 March 2020. Further Phase 4 remediation works were undertaken throughout each quarter of 2020 with both newly treated areas and maintenance works on previously remediated sites occurring.

Monitoring of remediated areas will continue until completion criteria outlined within the SRP has been met.

Other subsidence events are associated with the NWU Mine on WCPL-owned land. Subsidence monitoring has identified surface cracking typically in the predicted range of 20 mm to 100 mm wide, however some surface cracking within the range of 150 mm to 200 mm wide has been identified on land overlying Longwall 8a. In general, as the depth of cover decreases to the north, subsidence cracking widths tend to increase.

Remedial actions of subsidence impacts from the NWU Mine have, to date, included repairs to internal roads (i.e. filling in cracks to reduce safety risks).

Additional detail regarding subsidence rehabilitation methodologies is provided in **Section 6.3**.

Management of Potential Cultural and Heritage Issues

WCPL's 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 B7, Schedule 2 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.

Aboriginal Heritage

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 Heritage NSW.

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 under section 90 of the NPW Act and clauses 80D and 80E of the *National Parks and Wildlife Regulation, 2009*.

WCPL have been issued with the following consents regarding impacts to Aboriginal objects:

- On 20 June 2005, Aboriginal Heritage Impact Permit (AHIP) #2222 was issued to WCPL allowing for the disturbance and/or salvage of all known and unknown Aboriginal objects within the 'Application Area'. AHIP #2222 is scheduled to expire on 1 March 2025.
- On 19 November 2015, AHIP #C0001474 was issued for the development of the SBU Mine and is valid until 19 November 2025.
- On 16 January 2017, AHIP #C0002000 was issued for the development of the SWU Mine Modification and is valid until 16 June 2033.
- On 27 February 2018, an AHIP #C0003213 was issued for the development of the SBUE Mine and is valid until 27 February 2040.

An additional AHIP #2085 was granted to WCPL on 14 December 2004. Aboriginal heritage sites were salvaged under AHIP #2085 in advance of the construction of the rail loop. AHIP #2085 has since expired, however all salvaged materials are still managed in accordance with Care and Control Permit #3130 until they can be replaced on the post-mining rehabilitated landscape.

Further details on monitoring and management of Aboriginal heritage items are provided in the HMP.
Historic Heritage

A number of historic heritage surveys and assessments have been previously undertaken across the Wambo area and surrounds. The most recent large-scale historic heritage survey and assessment was conducted by EJE Town Planning (2003) as part of the Wambo Development Project EIS, which included surveys of lands in the vicinity of Wambo and an assessment of the heritage significance of sites identified during these surveys.

In addition to the EJE Town Planning (2003) survey and assessment, other previous investigations undertaken at Wambo and the immediate surrounds include (but are not limited to):

- Various archaeological assessments and surveys undertaken for the Modifications to Wambo (RPS Group, 2011; 2012a; 2012b; 2014; 2015; 2016).
- Historic heritage assessment undertaken for the United Wambo Open Cut Coal Mine Project (Umwelt, 2016).
- Historic heritage assessment undertaken for the SBUE Modification (EJE Heritage, 2017).
- On-going heritage management activities at the Mine.

The assessment undertaken by EJE Town Planning (2003) identified the Wambo Homestead Complex as the only item of non-Aboriginal heritage significance in the Wambo area. The Wambo Homestead Complex is located on the western side of Wollombi Brook and comprises eight distinct buildings and the remnants of barns with many fences to mounting yards and paddocks still in existence. The Wambo Homestead Complex curtilage is the boundary of the State Heritage Register of NSW listing.

In addition to the Wambo Homestead Complex, a number of other historic heritage items were recorded within the Wambo area and surrounds. The remaining sites are summarised in **Table 11**.

In accordance with Condition B7, Schedule 2 of DA 305-7-2003, assessments of the potential environmental consequences to historic heritage are included in the relevant Extraction Plan(s).

Table 11: Items of Historic Heritage Previously Recorded at Wambo and Surrounds

Site Number	Site Name	Description	Significance	Mitigation and Management
Site 3	Abandoned Homestead A	Located adjacent to Stony Creek within the underground mining footprint. The site consists of the remains of a cottage, four outbuildings and a pit mine. A number of moveable items are located at the site. The remains are ruins and therefore in very poor physical condition.	Minor Local Significance	WCPL will compile the photographic record of the Abandoned Stony Creek Cottage Site from 2003 and recent photos from 2015 and submit these to the Heritage Council and a local historic society for their records.

Table 11: Items of Historic Heritage Previously Recorded at Wambo and Surrounds (Continued)

Site Number	Site Name	Description	Significance	Mitigation and Management
Site 4	Whynot Homestead	Located to the southwest of the open cut footprint. The site is a federation period small farm site consisting of a weatherboard cottage and outbuildings. Overall, the buildings are in sound condition.	Limited Local Significance	WCPL has completed an archival recording of the Whynot Homestead and outbuildings in accordance with the Development Consent. In accordance with recommendations made by EJE Heritage (2017) and Mine Subsidence Engineering Consultants (MSEC) (2020), the Whynot Homestead will be fenced to prevent access prior to subsidence occurring, with demolition to be considered in the future if the structure(s) present an ongoing safety concern.
Site 5	Abandoned Homestead B	Located adjacent to Wollombi Brook in the vicinity of the Project rail loop. Homestead B consists of an abandoned cottage and shed. The physical condition of the buildings is poor.	Local Significance	This item will be unaffected by WCPL.
Site 6	Piggery and Butcher's Hut	Located within the footprint of the Project rail loop. The Piggery and Butcher's Hut are dilapidated and beginning to fall apart.	Minor Local Significance	The Piggery and Butcher's Hut will be clearly identified during construction activities to prevent accidental damage. No other measures are considered necessary.
Site 7	Aerial Footing	Located 200 m north of Site 6. Site 7 consists of a base plate and four stay points for an aerial or other tall, thin structure.	No Significance	No measures are considered necessary.
Site 8	"Montrose" Homestead	Located 400 m northwest of the open cut mine footprint. It consists of a brick and weatherboard homestead and a number of outbuildings including an old wool shed. The buildings are in good condition.	Slightly Significant	No specific mitigation measures are considered necessary.
Site 10	Roman Catholic Cemetery	Old Roman Catholic Cemetery is located at Jerrys Plains.	Local Significance	No measures are considered necessary.
Site 11	Old Anglican Cemetery	Old Anglican Cemetery is located at Jerrys Plains.	Regional Significance	No measures are considered necessary.
Site 12	St Philips Anglican Church and Cemetery	St Philips Anglican Church and Cemetery are located at Warkworth. The buildings and cemetery are in good condition.	Regional Significance	No measures are considered necessary.

Source: After EJE Town Planning (2003); EJE Heritage (2017).

Exploration Activities

The exploration drilling program will continue to update gas and coal quality data for WCPL. In general, all land preparation required will be in accordance with the SDP process. Mitigation measures relevant to exploration and land clearing activities at the Mine 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 and Burrow Clearance Protocol and SDP process have been developed. The SDP requires the approval of the Environmental Manager (or delegate) prior to any land clearing activities taking place. The Vegetation and Burrow Clearance Protocol and SDP aim 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.
- Additionally, an Exploration Drilling Permit has been developed that details the requirements and controls to be in place before the commencement of exploration activities. The Exploration Drilling Permit must be completed and signed off by the relevant departmental manager for all exploration activities.

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 process.

Decommissioning and sealing of boreholes and site rehabilitation will be conducted in accordance with the *Wambo Coal Exploration Rehabilitation Management Plan (WA-ENV-MNP-514)* which was approved by the RR in May 2020. Decommissioning of exploration sites consists of the disposal of all waste from site, sealing of borehole to surface and removal of drill casing from 1 m below surface. Drill sites are stabilised, decompacted, topsoil replaced and seed applied as necessary to facilitate the sites' return to its former land use.

WCPL operates under an approved Groundwater Management Plan. 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 DPE-Water in regards to licensing (where required).

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

6.2.2 Decommissioning

Site Security

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 implementation of fire management measures in accordance with the Bushfire Management Plan.
- Fence lines maintained in an operational condition.
- Right of way accesses to neighbours are maintained.
- Speed control signs have been installed on roads on WCPL-owned land.
- 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.

Site security measures will be implemented for the duration of the Mine. These measures will be maintained during closure, decommissioning and demolition activities to prevent unauthorised access and to ensure public safety. Security measures will include:

- fencing and signposting of the site;
- security patrols;
- all personnel, contractors and visitors will be required to undertake a relevant site induction and sign in and out of the site; and
- all visitors will be required to be accompanied by a site representative at all times.

Infrastructure to be Removed or Demolished

Infrastructure with no ongoing beneficial use will be removed from the site at the completion of the Mine. 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.

Roads that have no specific post-mining use will be ripped, topsoiled and revegetated.

Other decommissioning activities will generally involve consolidation and capping of the tailings dams under WCPL control, once the storage capacity of each respective tailings dam has been reached.

Train Loading Facility

Subject to consultation with relevant stakeholders at the time of decommissioning (e.g. DPE), rehabilitation of the train loading facility would be integrated and undertaken in concert with rehabilitation of the key Infrastructure Areas that are required for the life of the mine (e.g. CHPP). 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.

Site Services

Services will be removed unless they are of use in the post-mining land use. Electricity services to any remaining infrastructure will be removed prior to the commencement of any associated building demolition works. Telecommunications, water supply and other services will also be disconnected and removed where practical.

Where services are buried (i.e. pipelines, cables, etc.) and their retrieval may lead to further disturbance, the infrastructure may be left in situ, provided they do not pose constraints to the post-mining land use. In this situation, the location of the services will be surveyed and marked on the record tracings and a suitable caveat developed to ensure that they are readily identifiable for future landholders.

Buildings, Structures and Fixed Plant to be Retained

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.

Some access roads may be retained post-mining to enable access and for use in bushfire and other land management activities.

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).

Management of Carbonaceous Material

Management of the ROM coal stockpiles is the responsibility of United and is described in the United Phase 2 Rehabilitation Management Plan. Management of the product coal stockpiles is the responsibility of Wambo.

Excess coal material remaining at closure will be scraped up and either reprocessed or disposed of within the tailings/coarse reject emplacement areas on site.

Management of Contaminated Material

Where there is the potential that contamination may have occurred as a result of site activities (e.g. refuelling areas, workshops, etc), investigations will be undertaken to determine the presence and extent of any contamination. Where identified, contaminated material will be bioremediated on site or disposed of offsite at an authorised waste facility.

If applicable, a suitably qualified contamination expert will be engaged to verify that any contamination has been adequately managed.

Hazardous Materials Management

All remaining hydrocarbons such as diesel and lubricants and other hazardous materials will be either utilised or disposed of at an authorised facility.

The storage tanks will be removed and, depending on their condition, either sold or disposed of at an authorised facility.

It is envisaged that the majority of dangerous goods remaining onsite at the end of the mining operations will include gas bottles and cleaning agents, which will be utilised during decommissioning activities or disposed of offsite in accordance with the regulatory arrangements in force at the time.

Underground Infrastructure

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 RR requirements (*MDG6001 Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams* [Department of Trade and Investment, Regional Infrastructure and Services – Mine Safety Operations, 2012]). Box cut areas will be regraded, where necessary, and revegetated using appropriate plant species.

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 RR requirements (currently the *MDG6001 Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams* [Department of Trade and Investment, Regional Infrastructure and Services – Mine Safety Operations, 2012]).

6.2.3 Landform Establishment

Water Management Infrastructure

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.

Final Landform Construction: General Requirements

The final landform design and shape is the responsibility of United and is detailed in the United Phase 2 Rehabilitation Management Plan.

Final Landform Construction: Reject Emplacement Areas and Tailings Dams

United is responsible for the decommissioning of the North East Tailings Dam, Hunter Pit Tailings Dam and Homestead in-pit tailings dams. Once decommissioned, United also assumes responsibility for landform establishment and subsequent rehabilitation phases. Details of the activities proposed by United are provided in the United Phase 2 Rehabilitation Management Plan.

WCPL is responsible for the decommissioning, landform establishment and subsequent rehabilitation phases of the South Bates Sump Tailings Dam and the decommissioning and initial capping of Homestead In-Pit Tailings Dam.

Final Landform Construction: Final Voids, Highwalls and Low Walls

The final voids, highwalls and low walls are the responsibility of United and are detailed in the United Phase 2 Rehabilitation Management Plan.

Construction of Creek / River Diversion Works

Construction of the NWC Diversion was undertaken in a staged approach with construction design works undertaken and approved by DPE prior to the construction of the diversion in 2007.

The objective of the NWC Diversion was to divert flows in the NWC around the western limit of the open cut operations. The diversion was to be constructed in two stages:

- Stage 1: Initially the upstream portion of the Diversion would be constructed generally along the alignment shown in the Project EIS and would connect to the existing NWC channel upstream of the Wollemi Underground Mine Boxcut; and
- Stage 2: This stage would comprise an extension of the Stage 1 Diversion in a south-easterly direction to connect to the existing NWC channel downstream of the Wollemi Underground Mine Boxcut.

Gilbert and Associates Pty Ltd, in conjunction with Allan Watson Associates Pty Ltd, were commissioned by WCPL to design the NWC Diversion. The design process involved geotechnical site investigations; a geomorphological assessment of the NWC, detailed survey of the proposed inlet and outlet areas of the diversion; hydrological and hydraulic modelling and a pit inflow risk assessment study. The design was documented in the North Wambo Creek Diversion Design Report (Gilbert and Associates, 2007), which was appended to the original North Wambo Creek Diversion Plan.

The NWC Diversion design was developed in consultation with relevant stakeholders and was approved by the NSW Department of Planning in 2008, as part of the original North Wambo Creek Diversion Plan.

Rehabilitation of the NWC Diversion is described in detail in the North Wambo Creek Diversion Management Plan, a component of the WCPL Surface Water Management Plan.

6.2.4 Growth Medium Development

Once the final landform has been established, topsoil will be applied to the reshaped surface in an even layer generally not less than 100 mm.

Prior to application of topsoil, a pre-rehabilitation assessment will be undertaken. If the assessment determines the stockpiled topsoil material has:

- High sodicity, gypsum should be applied at a standard rate of 5 to 10 t/ha, depending on material sodicity.
- A significant weed infestation, the top layer of the stockpile may require scalping before underlying material can be used for topdressing.
- Low pH, lime should be applied at a rate determined by a lime requirement test.

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

Topsoil will be placed using rear dump haul trucks and spread with dozers or graders. Once spread, the topsoil surface will be 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.

Following topsoil establishment, erosion and sediment controls will be implemented in accordance with the ESCP.

During the topsoil shaping and final trim of rehabilitated areas, ground conditions and weather forecast will be considered prior to the movement of soils. During seasons with or forecast elevated rainfall and wet ground conditions, topsoil operations will be postponed preventing damage and loss of topsoil. Topsoil operations will recommence once ground conditions allow.

Topsoil operations will also be delayed during periods of high winds to prevent dust emissions and loss of soils.

Where appropriate and practical, stockpiled biological resources (e.g. tree hollows, logs and other woody debris) will be incorporated into the landform to augment habitat values.

6.2.5 Ecosystem and Land Use Establishment

The revegetation strategy includes the revegetation of disturbance areas with areas of woodland species, pasture species and riparian species.

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).
- Invasion from surrounding areas through vectors including birds, animals and wind.

The most common method of vegetation establishment at the Mine is broadcast direct 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 organic 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).

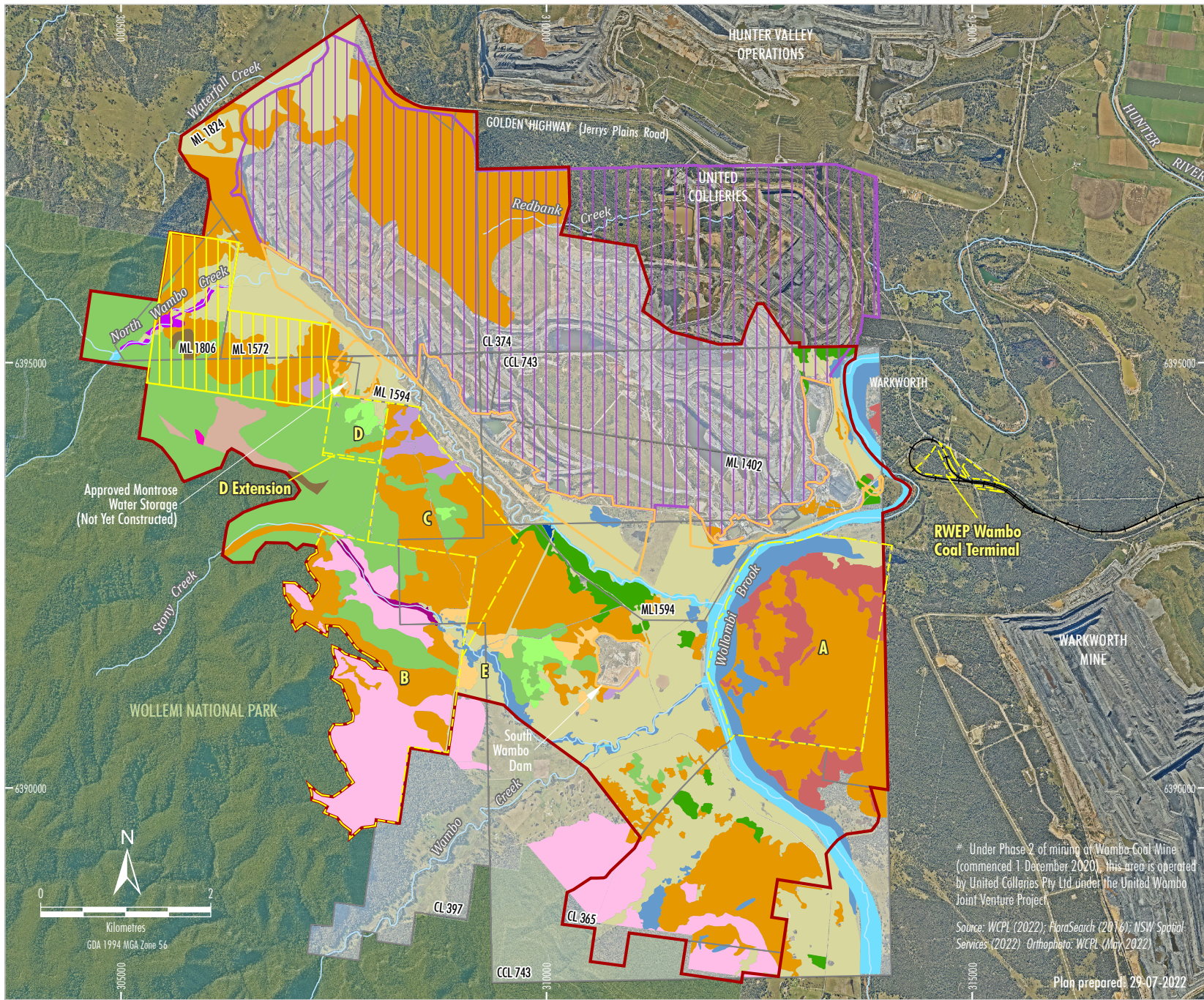
Following the changes in topography, drainage and soil conditions that results from open cut mining, some local provenance species may not be suitable for revegetation and seed sourced from outside the immediate district may be required. The most appropriate species to use to rehabilitate the area are those most suited to the soil types, drainage status, aspect and climate of the site. The biodiversity values of the surrounding native vegetation communities will be considered during rehabilitation planning. **Figure 7** details the vegetation community boundaries surrounding the Mine.

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.) and consider providing for the food and habitat needs of other threatened woodland species.

Revegetation of woodland areas includes the use of endemic plant species which are characteristic of the vegetation communities to be disturbed within the project boundaries of DA 305-7-2003. Where possible, seed collection and propagation activities will contribute to revegetation associated with the rehabilitation of disturbance areas.

Woodland revegetation is to be native woodland ecosystems characteristic of vegetation communities found in the local area and must complement the areas proposed for rehabilitation. The woodland revegetation areas will target the Plant Community Types (PCTs) described in the BMP (i.e. PCT 1603, PCT 1604 and PCT 1176).



- LEGEND**
- +— Wambo Coal Mine Rail Spur and Loop
 - ▭ National Park
 - ▭ Coal - Current Titles
 - ▭ SSD 7142 Operational Area #
 - ▭ Biodiversity Offset Area under SSD 7142
 - ▭ Project Approval Boundary
 - ▭ Existing/Approved Wambo Coal Mine Surface Development Area
 - ▭ Remnant Woodland Enhancement Program (RWEPA) Area
 - Plant Community Types
 - ▭ PCT 42: River Red Gum / River Oak Riparian Woodland Wetland in the Hunter Valley
 - ▭ PCT 116: Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley
 - ▭ PCT 836: Forest Red Gum - Rough-barked Apple Open Forest on Poorly Drained Lowlands of the Central Coast, Sydney Basin Bioregion
 - ▭ PCT 922: Melaleuca Decora Low Forest of the Central Hunter Valley, Sydney Basin Bioregion
 - ▭ PCT 1106: River Oak Riparian Woodland of the NSW North Coast Bioregion and Northern Sydney Basin Bioregion
 - ▭ PCT 1176: Slaty Box - Grey Gum Shrubby Woodland on Footslopes of the Upper Hunter Valley, Sydney Basin Bioregion
 - ▭ PCT 1292: Coastal Sandstone Riparian Scrub
 - ▭ PCT 1543: Rusty Fig - Native Quince - Native Olive Dry Rainforest of the Central Hunter Valley
 - ▭ PCT 1603: Narrow-leaved Ironbark - Bull Oak - Grey Box shrub - Grass Open Forest of the Central and Lower Hunter
 - ▭ PCT 1603: Narrow-leaved Ironbark - Bull Oak - Grey Box Shrub - Grass Open Forest of the Central and Lower Hunter (Disturbed)
 - ▭ PCT 1604: Narrow-leaved Ironbark - Grey Box - Spotted Gum Shrub - Grass Woodland of the Central and Lower Hunter
 - ▭ PCT 1653: Rough-barked Apple - Narrow-leaved Ironbark - Blakely's Red Gum - Bull Oak - Coast Banksia Woodland on Sands of the Warkworth Area
 - ▭ PCT 1655: Slaty Box - Grey Gum Shrubby Woodland on Footslopes of the Upper Hunter Valley, Sydney Basin Bioregion
 - ▭ PCT 1655: Slaty Box - Grey Gum Shrubby Woodland on Footslopes of the Upper Hunter Valley, Sydney Basin Bioregion (Disturbed)
 - ▭ PCT 1692: Bull Oak Grassy Woodland of the Central Hunter Valley
 - Grasslands and Shrublands
 - ▭ Derived Grassland
 - ▭ Escarpment Shrubland

* Under Phase 2 of mining at Wambo Coal Mine (commenced 1 December 2020) this area is operated by United Collieries Pty Ltd under the United Wambo Joint Venture Project

Source: WCPL (2022); FloraSearch (2016); NSW Spatial Services (2022) Orthophoto: WCPL (May 2022)

Plan prepared: 29-07-2022

Peabody
WAMBO COAL MINE
REHABILITATION MANAGEMENT PLAN 2022

Vegetation Community Boundaries

Figure 7

6.2.6 Ecosystem and Land Use Development

At the ecosystem and land use development phase, rehabilitation monitoring results would be used to confirm rehabilitation areas are on a trajectory towards a self-sustaining ecosystem and 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 10.2**.

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.

Notwithstanding the above, potential rehabilitation maintenance requirements include (but are not necessarily limited to):

- Weed and feral animal control of rehabilitation.
- Erosion control works.
- Re-seeding/planting of rehabilitation areas that may have failed.
- Maintenance fertilising.
- 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 and opportunistic inspections of rehabilitated areas as described in the BMP.

6.3 REHABILITATION OF AREAS AFFECTED BY SUBSIDENCE

All areas affected by subsidence at the Mine are covered by an associated Extraction Plan. Where relevant, these Extraction Plans describe the proposed subsidence remediation processes that would be undertaken if required.

A summary of subsidence management and/or remediation measures are provided below, including an outline of the relevant Extraction Plan(s) and the Subsidence Monitoring and Remediation Program.

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(s). The Extraction Plan(s) also detail relevant monitoring and management measures that will be undertaken relevant to each identified impact.

As required by the Extraction Plan(s), remediation of subsidence impacts or environmental consequences detected by subsidence monitoring will be conducted where required in consideration 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 (including site accessibility).

A number of potential management measures are available to mitigate/remediate subsidence impacts on land in general resulting from underground mining operations.

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 25 mm to 50 mm, but up to approximately 150 mm) will be undertaken using conventional earthmoving equipment (e.g. a backhoe) and will include:

- Infilling of surface cracks with soil or other suitable materials.
- 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 WCPL's Vegetation and Burrow Clearance Protocol.

The need for further remediation works will be assessed against the completion criteria outlined in **Section 4**, and in accordance with the Trigger Action Response Plan (TARP) outlined in **Section 10.2**.

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 Extraction Plan(s), if subsidence impacts result in greater than predicted impacts, exceedance of the performance criteria or requires greater than expected remediation activities (as described in the relevant Extraction Plan[s]), WCPL will notify and consult with the RR.

If required, a revision of this RMP will be undertaken to ensure rehabilitation activities are consistent with the revised subsidence predictions and mitigation measures outlined in the Extraction Plan(s).

Subsidence Management and Extraction Plans

A subsidence impact assessment was undertaken by G.E. Holt and Associates for the Project EIS (WCPL, 2003). 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*. 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.

- 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.
- MSEC (April 2018) Extraction Plan for WYLLW17 to WYLLW20 in the Whybrow Seam.
- MSEC (July 2020) Extraction Plan for WYLLW21 to WYLLW24 in the Whybrow Seam.

The various Extraction Plan approvals are summarised below, and include:

- NWU Subsidence Management Plan (SMP) for Longwalls 1 to 6.
- NWU Extraction Plan for Longwalls 7 to 10a.
- SBU Extraction Plan for Longwalls 11 to 13.
- SBU Extraction Plan for Longwalls 11 to 16.
- SBUE Extraction Plan for Longwalls 17 to 20.
- SBUE Extraction Plan for Longwalls 21 to 24.

Potential impacts and the relevant mitigation and management measures associated with future longwalls (e.g. SWU Mine) will be assessed and detailed as part of future Extraction Plan(s).

Subsidence Monitoring and Remediation Program

Details of subsidence impacts observed are logged with a Global Positioning System and photographically recorded in the Subsidence Impact Register, maintained by WCPL's Chief Surveyor. Visual inspections will be undertaken in accordance with inspection checklists as provided in the relevant Extraction Plan(s).

Suitably experienced consultants conduct biannual subsidence monitoring of the WCPL subsidence areas. These inspections identify subsidence impacts and record subsidence location, length, width, depth, fill required, recommendations and risk ranking. Subsidence locations are also photographed to monitor visual changes. This monitoring forms the bases of subsidence remediation and repair work.

On an annual basis, WCPL will prepare a subsidence remediation action plan to remediate areas of subsidence that require action based on recommendations of the biannual monitoring. Areas will be prioritised based on the risk ranking. 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 around subsidence remediation areas will be inspected on a monthly basis, or following rainfall events of equal to or greater than 20 mm per day (midnight to midnight) as recorded by the Wambo Meteorological Station. The sediment control structures will be inspected for capacity, structural integrity and effectiveness.

Subsidence monitoring and remediation undertaken each year will be reported in the Annual Rehabilitation Report.

7 REHABILITATION QUALITY ASSURANCE PROCESS

A Rehabilitation Quality Assurance Process will be implemented which details rehabilitation, key actions and/or processes nominated for each phase throughout the life of the operations to ensure that:

- Rehabilitation is implemented in accordance with the nominated methodologies.
- Identified risks to rehabilitation are adequately addressed before proceeding to the next phase of rehabilitation.

The Rehabilitation Quality Assurance Process will be integrated into day to day operations at the Mine as outlined in **Table 12**. Rehabilitation validation monitoring is undertaken as described in **Section 8**.

Table 12: Rehabilitation Quality Assurance Processes

Rehabilitation Quality Assurance Processes	Responsibility	Documenting and Recording Process
<i>Land Clearance</i>		
Establish existing environmental baselines.	Manager: Environment and Community	Project EIS and Environmental Assessments.
Maximise opportunities for salvage of biological and habitat resources in accordance with the Vegetation and Burrow Clearance Protocol.	Manager: Environment and Community	SDP.
Undertake pre-clearance surveys and due diligence assessments.	Manager: Environment and Community	SDP.
Undertake topsoil stripping and management in accordance with the Topsoil Management Procedure.	Manager: Environment and Community	Topsoil Management Procedure.
Forward mine planning to provide sufficient time for the implementation of pre-clearance procedures.	Mining Engineering Manager.	Mine Planning.
Identification and collection of local seed in accordance with the Annual Seed Collection Program.	Manager: Environment and Community	Annual Review.
Minimise the extent of clearing and disturbed land to the greatest extent practicable at any given time.	Mining Engineering Manager.	SDP.
Minimise ground disturbance during exploration activities.	Manager: Environment and Community	SDP.
<i>Active Mining and Production</i>		
Develop and maintain a topsoil balance and database with details of stockpile sizes, treatments and future topsoil requirements.	Manager: Environment and Community	Topsoil Management Procedure. Annual Review.
Locate and manage soil stockpiles in accordance with the Topsoil Management Procedure.	Manager: Environment and Community	Topsoil Management Procedure. Annual Review.
Regular sampling and testing of CHPP rejects and tailings.	CHPP Manager	Dam Management System.
Tailings capping method investigations.	CHPP Manager	Dam Management System.
Specialist advice on effective managing and mitigation of potential interference to rehabilitation establishment or downstream pollution as a result of exposure to adverse geochemical material.	Manager: Environment and Community	Mine Planning.

Table 12: Rehabilitation Quality Assurance Processes (Continued)

Rehabilitation Quality Assurance Processes	Responsibility	Documenting and Recording Process
<i>Decommissioning</i>		
Develop and maintain a register of contaminated sites, waste landfill sites and bioremediation areas.	Manager: Environment and Community	Land Contamination Register.
Erosion and sediment control practices in accordance with the ESCP.	Manager: Environment and Community	Annual Review.
Environmental monitoring programs regularly undertaken and improved.	Manager: Environment and Community	Annual Review.
Prior to demolition activities, ensure appropriate heritage approvals and or management measures are in place (e.g. archival recording, restoration of building etc.).	Manager: Environment and Community	HMP.
Remove electrical services to any infrastructure scheduled for demolition prior to commencement of works.	Infrastructure Coordinator	Work Order. (Proposed) Decommissioning Plan.
Remove telecommunications, water supply and other services where practical.	Infrastructure Coordinator	Work Order. (Proposed) Decommissioning Plan.
Where services are buried and retrieval may lead to further disturbance, infrastructure to be left <i>in situ</i> , provided this does not compromise the Final Land Use.	Infrastructure Coordinator	Work Order. (Proposed) Decommissioning Plan.
Location of services to be left <i>in situ</i> will be surveyed and marked on site plan to ensure they are readily identifiable for future land holders.	Mine Surveyor	Survey Database.
Prior to demolition, infrastructure would be evaluated for potential hazardous substances (e.g. asbestos, radiation sources etc.) and appropriate strategies developed to protect employees, the public and the environment.	Infrastructure Coordinator	(Proposed) Contractor inspection report and management strategy. Asbestos Management Plan.
All buildings, fixed plant and other infrastructure not to be retained as part of the Final Land Use will be demolished and removed. Demolition will be carried out in accordance with AS 2601-2001: <i>The Demolition of Structures</i> (or its latest version).	Infrastructure Coordinator	Photographs and Contractor demolition reports.
Concrete footings and pads (along with other potential inert building waste) will be broken up and buried in the pit area or used in rehabilitation where appropriate.	Infrastructure Coordinator	Photographs.
Where infrastructure is approved to remain as part of the Final Land Use, a structural assessment will be prepared by a suitably qualified person to determine the structural integrity of the structure and identify the associated short and long-term risks to public safety and the environment.	Infrastructure Coordinator	(Proposed) Contractor structural assessment report.
Any ore spillages or hazardous materials will be removed.	Manager: Environment and Community	Photographs.

Table 12: Rehabilitation Quality Assurance Processes (Continued)

Rehabilitation Quality Assurance Processes	Responsibility	Documenting and Recording Process
<i>Decommissioning (Continued)</i>		
Potentially contaminated areas will be assessed and remediation undertaken as required.	Manager: Environment and Community	(Proposed) Contractor assessment report and remediation plan.
Decommissioning and removal of underground infrastructure.	Technical Services Manager	Annual Review.
Seal all mine openings, boreholes, gas wells etc.	Technical Services Manager	Annual Review.
<i>Final Landform Establishment</i>		
Water Management Areas (where retained as part of the Final Land Use) should have excess sediment removed, be reshaped for their intended use, have drainage structures to capture runoff from sufficient catchment area to ensure the dam can be used for its intended use, have appropriate sediment and erosion control measures, and be appropriately licensed in perpetuity.	Manager: Environment and Community	(Proposed) ESCP/s for proposed facilities to be retained. (Proposed) Contractor reports.
Reject emplacement areas and tailings dams under WCPL control are to be rehabilitated to a capability that supports the Final Land Use and are safe, stable and non-polluting.	Manager: Environment and Community	RMP.
Final landform design will consider the surrounding landforms, suitable drainage, erosion and sediment control structures, geochemical constraints and geotechnical issues.	Manager: Environment and Community	RMP.
The stability and revegetation of the NWC Diversion will be reviewed to inform remediation/rehabilitation works.	Manager: Environment and Community	Annual NWC Diversion Monitoring report.
Subsidence monitoring of affected areas will continue until it is demonstrated that all measurable subsidence has ceased.	Technical Services Manager	Subsidence Monitoring and Impacts Register.
Subsidence monitoring pegs will either be removed or cut-off below ground level once monitoring is complete and approval to remove the pegs has been granted.	Technical Services Manager	Subsidence Monitoring and Impacts Register.
Rehabilitation of subsidence affected areas will be undertaken in accordance with the relevant Extraction Plan(s).	Manager: Environment and Community	Annual Review.
<i>Growth Medium Development</i>		
Rehabilitation methodologies to be developed to achieve nominated Rehabilitation Objectives and Completion Criteria in consideration of site-specific constraints.	Manager: Environment and Community	RMP.
Undertake topsoil application and management in accordance with the Topsoil Management Procedure, including application of ameliorants or organic matter.	Manager: Environment and Community	Topsoil Management Procedure.
Erosion and sediment control practices in accordance with the ESCP.	Manager: Environment and Community	Annual Review.
Schedule and undertake revegetation activities according to weather and climatic conditions.	Manager: Environment and Community	Annual Review.
Avoid compaction of rehabilitation substrate.	Manager: Environment and Community	Topsoil Management Procedure.

Table 12: Rehabilitation Quality Assurance Processes (Continued)

Rehabilitation Quality Assurance Processes	Responsibility	Documenting and Recording Process
<i>Growth Medium Development (Continued)</i>		
Restore soil structure by ripping in parallel with contours.	Manager: Environment and Community	Topsoil Management Procedure.
Where supplementary topsoil shortages with suitable alternatives (e.g. biosolids, organic growth medium or other substitutes) consider the risk of introducing hazards to the establishment of the preferred PCT.	Manager: Environment and Community	Topsoil Management Procedure. Rehabilitation Risk Assessment
Use structures such as tree hollows, logs and other woody debris, rock material to augment the habitat value of rehabilitation.	Manager: Environment and Community	Photographs and Annual Biodiversity Monitoring
<i>Ecosystem and Land Use Establishment</i>		
Preference locally sourced seed materials for revegetation activities (where available).	Manager: Environment and Community	Order records and Invoicing
Consider implementing techniques such as brush matting where disturbed areas are directly adjacent to mature ecosystems to stabilise the site while natural recruitment occurs.	Manager: Environment and Community	RMP. BMP.
If revegetation is delayed due to unsuitable seasonal conditions, undertake temporary stabilisation measures (e.g. sterile cover crops, erosion and sediment controls) to avoid erosion and further land degradation.	Manager: Environment and Community	ESCP. RMP. Topsoil Management Procedure.
Spread seed as soon as possible following ripping. If delayed, assess whether re-ripping is required.	Manager: Environment and Community	RMP.
Undertake bushfire management activities in accordance with the Bushfire Management Plan.	Manager: Environment and Community	Annual Review.
Use appropriate earthmoving equipment.	Manager: Environment and Community	RMP.
Engage suitably qualified contractors to undertake all works.	Manager: Environment and Community	Tender process and experience
Record seed germination and seeding success rates to assess against target densities.	Manager: Environment and Community	Results of seed germination testing. Certificates for all seed collected or supplied by an external contractor are obtained.
Maximise the number of target species within the first round of revegetation activities to facilitate species richness.	Manager: Environment and Community	Annual Biodiversity Monitoring.
Augment habitat to encourage initial colonisation of target fauna species (e.g. nest boxes, salvaged hollows, den sites, habitat ponds, etc.)	Manager: Environment and Community	Annual Biodiversity Monitoring.
Maintain stock control fencing to prevent access to revegetation areas.	Manager: Environment and Community	BMP.
Conduct regular site inspections (at least quarterly) to assess revegetation establishment and site conditions until vegetation has become well established and the site can be considered stable.	Manager: Environment and Community	BMP.

Table 12: Rehabilitation Quality Assurance Processes (Continued)

Rehabilitation Quality Assurance Processes	Responsibility	Documenting and Recording Process
<i>Ecosystem and Land Use Establishment (Continued)</i>		
Consider implementation of LiDAR or drones to conduct additional inspection and analysis of rehabilitation.	Manager: Environment and Community	Video and photographic records.
Implement a long-term monitoring program to evaluate trajectory of rehabilitation against Rehabilitation Objectives and Completion Criteria.	Manager: Environment and Community	BMP and Annual Biodiversity Monitoring.
Develop a Rehabilitation Management and Maintenance Program based on the needs identified in the rehabilitation monitoring program. The objective of this program is to facilitate progress towards the Rehabilitation Objectives and Completion Criteria.	Manager: Environment and Community	BMP and Annual Biodiversity Monitoring.
<i>Ecosystem and Land Use Development</i>		
Continue Rehabilitation Management and Maintenance Program.	Manager: Environment and Community	BMP and Annual Biodiversity Monitoring.
Continue rehabilitation monitoring programs.	Manager: Environment and Community	BMP and Annual Biodiversity Monitoring.
Actively manage rehabilitated lands in accordance with the Final Land Use(s).	Manager: Environment and Community	Annual Review.

8 REHABILITATION MONITORING PROGRAM

8.1 ANALOGUE SITE BASELINE MONITORING

Where relevant, the performance indicators and completion criteria discussed in **Section 4** have been based on monitoring results collected from seeded analogue sites representative of the proposed final land use for that domain (e.g. woodland and pasture areas).

LFA rehabilitation establishment monitoring 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. These transects are monitored annually either in autumn or spring following the commencement of revegetation.

8.2 REHABILITATION ESTABLISHMENT MONITORING

A summary of the monitoring in the BMP (where relevant to rehabilitation) is provided in **Table 13**. Details on the monitoring program requirements and timing are provided in the following sections.

Table 13: Rehabilitation Monitoring Program

Monitoring	Area	Timing
LFA	Woodland Rehabilitation	Annually (Autumn or Spring).
Biometric	Woodland Rehabilitation	Annually (Spring).
	NWC Diversion	
	Pasture Rehabilitation	
Visual Monitoring	All Rehabilitation Areas	Annually.
Subsidence Inspection	Areas overlying the Underground Mining Area (SMP)	Annually.
Mine Closure	All rehabilitation works	As required.

8.2.1 Landscape Function Analysis

LFA has previously been widely used across rehabilitated landscapes at the Mine. 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 variety of measured site attributes contribute to LFA as provided in Tongway and Hindley (2004). These assessments are:

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

LOI 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 (**Table 14**), 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 14: Soil Surface Condition Indicators

Soil Surface Condition Indicators	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, immoveable 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	

Development of Landscape Function Analysis Completion Criteria

Table 15 below details the system used to highlight the performance of each LFA site within each rehabilitation area.

Table 15: Landscape Function Analysis Performance Criteria

Landscape Function Analysis Performance	Criteria
Acceptable	Area is generally meeting or exceeding target values and values do not show trend of declining over time – where monitoring sites are meeting targets and values are relatively consistent, reducing monitoring to infrequent LFA when changes in landscape or management practices occur (i.e. fire or grazing).
Monitor	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.
Possible Management	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.
Rework	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.

Completion Criteria 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. Completion Criteria are provided in **Table 16** below, along with the average and range of scores from the 2015 baseline monitoring program. Monitoring results can then be compared to these performance criteria to determine if management actions, as described in **Section 10.2**, are likely to be required.

Table 16: Landscape Function Analysis Completion Criteria and Baseline Scores

Site Type		Relevant LFA Index			
		LOI	SI	INFI	NI
Native Ecosystem Rehabilitation	Completion Criteria	>0.87	>59	>43	>36
	Average Score	0.79	62.67	42.77	38.17
	Range	0.68-0.92	59.7-63.7	34.6-55.1	28.7-47.1
Pasture Rehabilitation	Completion Criteria	>0.93	>61	>29	>25
	Average Score	0.76	61.9	38.43	30.23
	Range	0.47-0.97	49.1-68.8	24.9-46.6	23.6-38.8
NWC Diversion	Completion Criteria	>0.84	>62	>41	>37
	Average Score	0.64	58.5	29.4	24.4
	Range	0.45-0.81	50.3-66.7	22.1-39.4	18.7-30.7
Wambo Creek (Reference site: 14R)	Completion Criteria	>0.84	>62	>41	>37
	Average Score	1.0	52.5	47.1	30.7

WCPL will continue to review the use of LFA as a monitoring method and transition to alternative monitoring methods for rehabilitated landscape establishment which may include soil monitoring, Biometric Vegetation Assessment and visual assessment as detailed below.

8.2.2 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 pre-defined 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 17**.

Table 17: Biometric Site Attributes and Measurement Parameters

Site Attribute	Measurement Parameter
Native Plant Species Richness (NPS)	Number of native plant species within 400 metres squared (m ²) 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 1 m.
Native Ground Cover (shrubs) (NGCS)	Cover below 1 m along a 50 m transect (%) – measured every 1 m.
Native Ground Cover (other) (NGCO)	Cover below 1 m along a 50 m transect (%) – measured every 1 m.
Exotic Plant Cover (EPC)	Cover along a 50 m transect (%) – measured every 1 m.
Overstorey Regeneration (OR) within vegetation zone	Overstorey canopy species <5 cm diameter at breast height (DBH) within a 1,000 m ² plot (score 0 to 1).
Number of Trees With Hollows (HBT)	Number of trees containing hollows within a 1,000 m ² 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 m ² plot (metres).

Permanent flora survey quadrats will be established in woodland rehabilitation areas to obtain quantitative data on plant species diversity and abundance. Quadrat data will be collected at each of the floristic quadrat monitoring sites. Permanent quadrats will also be established along the NWC Diversion.

Biometric monitoring will be undertaken at the same time as the LFA monitoring.

Development of Biometric Assessment Completion Criteria

Table 18 below details the system which has been developed to rank each measured attribute according to the performance and management actions required. The performance criteria below was developed using Table 3 in BioMetric 2.0 Operational Manual assessment methodology (NSW Department of Environment and Climate Change, 2008) which was designed to score Biometric vegetation plots based on the difference between the measured values and the benchmark values for each PCT. Benchmark values were determined by the OEH (now BCD) for each PCT and these were adapted to create aspirational but achievable targets. 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 have 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.

In addition to the completion criteria below, flora species composition of woodland rehabilitation will be compared to the characteristic species in each target PCT and against the vegetation needs of threatened woodland species known or predicted from the local area to identify the need for additional planting or seeding.

Average values will be used for assessment against completion criteria where multiple sites sample rehabilitation of similar age and treatment. Individual site scores will be reported and investigation initiated at sites where completion criteria are not met to determine if these poor scores are representative of a broader area and additional actions are required.

Table 18: Biometric Site Attributes Performance Criteria

Site Attribute	Needs Greater Improvement	In Need of Improvement	Not Meeting Target but Values Still May be Acceptable	Within Target Range)
NPS	0-10%	>10-<50% of target range	50-<100% of target range	≥ target range
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
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
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
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
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 OR in vegetation zone	0	0-0.5	0.5-1	1
EPC	>66%	33-66%	10-33%	0-10%

Completion criteria for seven PCTs within the RWEPA areas have been developed considering both the baseline data collected during the 2014/2015 monitoring program and the BCD benchmark values for each PCT. This criterion is included within **Table 19**, along with the average value calculated from the site value scored for each monitoring plot within the PCT.

Community condition benchmarks have been modified to provide realistic, ambitious but achievable performance criteria for each PCT. Monitoring results can then be compared to these performance criteria to determine if management actions, as described in **Section 10.2**, are likely to be required.

Table 19: Biometric Site Attributes Completion Criteria and Baseline Scores

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	Completion Criteria	>20	10-50	10-50	20-60	1-5	5-30	<10	1	-	-
	Average Value	14.3	15.3	14.5	28.9	1.1	6.9	38.3	1	0	14.9
	Range	10-19	0.5-27	0-34	12-64	0-2	0-38	0-54	1	0	0-35
	Benchmark Value	38	10-50	10-50	20-60	1-5	10-30	<5	1	0.1	10
PCT 1658: Rough barked Apple-Narrow leaved Ironbark-Blakely's Red Gum-Bull Oak-Coast Banksia woodland on sands of the Warkworth area	Completion Criteria	>20	10-40	10-50	4-20	5-30	5-35	<10	1	-	-
	Average Value	27	11.8	10.8	19.5	3.5	31	10.4	1	1	13.9
	Range	23-31	3.5-17	5.5-17.5	10-28	2-4	14-60	0-32	1	0-2	4-34
	Benchmark Value	26	13-40	10-50	4-15	5-30	5-25	0	1	0.8	20
PCT 1603: Narrow leaved Ironbark - Bull Oak - Grey Box shrub- grass open forest of the central and lower Hunter	Completion Criteria	>25	10-40	5-10	15-50	5-10	5-40	<5	1	-	-
	Average Value	29	13.8	9.2	26	7.4	4	0.2	1	0.7	26.35
	Range	12-41	7-22.5	0-14	4-56	2-30	0-18	0-2	1	0-3	4-60
	Benchmark Value	41	15-40	5-10	30-50	5-10	20-40	<5	1	3	5

Table 19: Biometric Site Attributes Completion Criteria and Baseline Scores (Continued)

PCT		NPS	NOS (%)	NMS (%)	NGCG	NGCS	NGCO	EPC	OR	HBT	FL
PCT1604: Narrow leaved Ironbark – Grey Box - Spotted Gum shrub - grass of the central and lower Hunter	Completion Criteria	>35	15-40	5-20	30-50	5-15	5-40	<5	1	-	-
	Average Value	35	22.5	7.2	34	8	5.3	0	1	0	35.3
	Range	36-42	14.5-23	7.5-12	22-52	6-16	0-12	0	1	0	38-45
	Benchmark Value	41	15-40	5-20	30-50	5-10	20-40	<5	1	3	5
PCT1176: Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	Completion Criteria	21	15-40	5-30	5-30	0-25	2-10	<5	1	-	-
	Average Value	31	12.1	11.6	23.5	3	6	0	1	0	26
	Range	27-33	12-12.5	10.5-13.5	6-36	0-2	0-6	0	1	0	17-40
	Benchmark Value	21	19-42	6-24	5-20	0-25	2-10	<5	1	1	30
PCT 1584: White Mahogany – Spotted Gum - Grey Myrtle semi-mesic shrubby open forest of the central and lower Hunter Valley	Completion Criteria	>45	15-45	5-40	5-40	10-20	5-20	0	1	-	-
	Average Value	50	10.5	19	70	16	8	0	1	0	25
	Benchmark Value	51	22-45	5-40	5-25	10-20	5-20	<5	1	1	20
PCT 1603: Narrow-leaved 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	-	-
	Average Value	39	5.5	25.7	40.7	6.7	12.6	4	1	0	12.6
	Range	30-47	6.5-9	10.1-17	46-52	4-16	8-22	0-2	1	0	6-25
	Benchmark Value	41	15-40	5-10	30-50	5-10	20-40	<5	1	3	5

* Benchmark values for PCT 1603: Narrow-leaved Ironbark – Bull Oak - Grey Box shrub - grass open forest of the central and lower Hunter, however this vegetation may be derived from more than one community or from a transition zone between plant communities.

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.

LFA and Biometric Monitoring will be adopted as the primary monitoring methodologies to assess revegetated landscape stability and progress towards quantitative completion criteria targets.

8.2.4 Subsidence Inspections

Areas overlying existing underground workings or proposed underground mining areas are subject to annual subsidence monitoring inspections. These inspections:

- identify any isolated surface disturbances;
- assess the level of disturbance to native vegetation and the condition of the vegetation (e.g. health and vigour of species and communities); and
- assess any changes in drainage lines or watercourses (that may be attributable to subsidence).

Details regarding the remediation of subsidence impacts are provided in the relevant Extraction Plan(s).

8.2.5 Mine Closure Monitoring

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.

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 MEASURING PERFORMANCE AGAINST REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

The results of rehabilitation monitoring will be compared against the completion criteria described in **Section 4**. Details of rehabilitation monitoring will be provided in subsequent Annual Rehabilitation Reports and Forward Programs.

Summaries of the monitoring results and performance against rehabilitation objectives and completion criteria will be included in this section when the RMP is updated or revised.

9 REHABILITATION RESEARCH, MODELLING AND TRIALS

9.1 CURRENT REHABILITATION RESEARCH, MODELLING AND TRIALS

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 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.
- Subsidence repair trials.
- Remediation of approximately 1 km of the NWC Diversion, as guided by the North Wambo Creek Diversion Management Plan, including the application of gypsum to improve soil sodicity and structure beneath newly constructed rock chutes.
- Revise rehabilitation monitoring program to address knowledge gaps, develop appropriate quantifiable criteria and revise triggers and responses in TARP.

As described in **Section 8.2.2**, completion criteria for rehabilitation have been developed using BCD benchmarked values for each applicable PCT.

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



9.2 FUTURE REHABILITATION RESEARCH, MODELLING AND TRIALS

WCPL continue to refine the methodology used to rehabilitate subsidence impacted areas. Several methodologies have been used in the last 5 years and are being monitored to determine their progression. Trial areas are inspected biannually with results reviewed to determine the most successful rehabilitation methodology. Future rehabilitation of subsidence will be conducted based on the results of these trials. The current methodology used based on existing trial results includes the digging out of subsidence cracks and potholes to a depth of 2 m, before installing geofabric and backfilling with gypsum ameliorated fill material.

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.

A detailed description of the future rehabilitation research and trials that will be carried out over the relevant 3 year period are provided in the Forward Program.

Outcomes of research and rehabilitation trials are provided annually in the Annual Rehabilitation Report and Forward Program.

10 INTERVENTION AND ADAPTIVE MANAGEMENT

10.1 THREATS TO REHABILITATION

As described in **Section 3**, the Rehabilitation Risk Assessment identified a total of 87 risks. Of these risks, 60 were ranked as low, 22 were ranked as low to medium and five were ranked as medium. No risks were ranked as high. Note, some risks were duplicated during different rehabilitation phases (e.g. potential weather impacts to rehabilitation was ranked as a low to moderate risk during ecosystem establishment and also during ecosystem and land use development).

Table 20 outlines potential threats and consequences associated with rehabilitation activities. A TARP has been developed (**Section 10.2**) to identify appropriate response measures to manage the potential rehabilitation threats that were identified as low to medium or medium risk.

Table 20: Summary of Potential Threats to Successful Rehabilitation

Rehabilitation Threat	Potential Consequence/Hazard
Topsoil	<ul style="list-style-type: none"> • Insufficient topsoil depths/volume. • Topsoil management methods not effective resulting in compromised topsoil stockpiles. • Loss of topsoil material due to erosion, poor vegetation establishment and interaction with vehicles. • Topsoil characterisation determines soil parameters not within the preferred range for pH, sodicity, salinity ranges resulting in limited plant growth.
Hazardous Materials	<ul style="list-style-type: none"> • Waste rock characterisation determines soil parameters not within preferred range (i.e. hazardous waste rock material in final landform). • Spontaneous combustion event underground or at stockpile.
Final Landform Surface	<ul style="list-style-type: none"> • Tailings storage facility capping fails resulting in discharge to environment/watercourse. • Large rocks on surface.
Landform and Land Use	<ul style="list-style-type: none"> • Excessive slope lengths. • Steep slope gradients. • Maximum height of final landforms greater than RL 160 m AHD.
Vegetation	<ul style="list-style-type: none"> • Poor establishment, excessive weeds, low species composition, mono-culture. • Low LFA scores. • Low ground cover or high cover of exotic species. • Native tree and shrub seed not available to complete revegetation. • Native pasture seed not available to complete revegetation.
Discharges to Environment	<ul style="list-style-type: none"> • Pollution of downstream watercourses. • Impacts to other water users.
Erosion and Sediment Control	<ul style="list-style-type: none"> • Landform not stable. • Failure of water management structures and ability to freely drain.
Subsidence	<ul style="list-style-type: none"> • Presenting an immediate safety or environmental hazard. • Preventing attainment of final land use. • Creek instability and/or hydraulic losses. • Extensive water ponding impacting rehabilitation.

Table 20: Summary of Potential Threats to Successful Rehabilitation (Continued)

Rehabilitation Threat	Potential Consequence/Hazard
Decommissioning	<ul style="list-style-type: none"> • Decommissioning has not removed all redundant services, infrastructure, carbonaceous material, wastes hazardous materials, sealing of mine and ventilation shafts etc. post mine closure. • Unauthorised access to underground workings.
Terrestrial Fauna	<ul style="list-style-type: none"> • Native species diversity is low in rehabilitation areas. • High numbers of feral animals are identified in rehabilitation areas.
Weather and Climatic Influences	<ul style="list-style-type: none"> • Weather conditions not appropriate for establishing rehabilitation, resulting in delays to ecosystem establishment. • Weather conditions (e.g. bushfire, drought, flooding, etc.) result in damage to rehabilitation.
Performance Criteria	<ul style="list-style-type: none"> • Current rehabilitation monitoring program and available data (to date) insufficient to develop quantifiable criteria for mine closure and relinquishment. • Rehabilitation standards advance significantly during mine operation resulting in increased requirements for rehabilitation relinquishment.

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

10.2 TRIGGER ACTION RESPONSE PLAN

WCPL have prepared a TARP for rehabilitation to identify appropriate response measures in the event rehabilitation outcomes are not achieved.

Table 32 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 RMP amendments as soon as the data is available from the respective programs.

Table 21: Rehabilitation Trigger Action Response Plan

Rehabilitation Risk	Consequence/Hazard	TARP Code	Contingency Reponses
Topsoil	Insufficient topsoil depths/volume. Topsoil management methods not effective resulting in compromised topsoil stockpiles.	Trigger	<ul style="list-style-type: none"> Monitoring confirms average topsoil replacement at depths <100 mm. Monitoring confirms topsoil has not been ripped appropriately.
		Action	<ul style="list-style-type: none"> Topsoil is to be re-applied at a minimum depth of 100 mm. Topsoil ripped to a depth of 300 mm to 500 mm. 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 100 mm. Review Topsoil Management Procedure and ensure adequate training for rehabilitation staff/contractors.
		Responsible Persons	Manager: Environment and Community
	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	Manager: Environment and Community

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Reponses
Topsoil (Continued)	Topsoil characterisation determines soil parameters not within the preferred range for pH, sodicity, salinity ranges resulting in limited plant growth.	Trigger	<ul style="list-style-type: none"> Topsoil characterisation confirms: <ul style="list-style-type: none"> Soil pH (H₂O) range is outside the preferred range of pH 5.5 – pH 7.8; Soil EC (H₂O) is greater than 1200 µS/cm; and Soil Phosphorus. Colwell Method (Pasture: 20-40 mg/kg) (Native: 10-20 mg/kg). Bray Method (Pasture: 12-22 mg/kg) (Native: 6-12 mg/kg): <ul style="list-style-type: none"> 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.
		Responsible Persons	Manager: Environment and Community
Hazardous Materials	Waste rock characterisation determines soil parameters not within preferred range (i.e. hazardous waste rock material in final landform).	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 outside pH 5.5 – pH 7.8; and Soil EC (H₂O) is greater than 1200 µS/cm.
		Action	<ul style="list-style-type: none"> Application of appropriate soil ameliorants at rates per ha 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	Manager: Environment and Community and Open Cut Mine Manager

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Reponses
Hazardous Materials (Continued)	Spontaneous combustion event underground or at stockpile.	Trigger	<ul style="list-style-type: none"> Spontaneous combustion events identified at either the ROM/product stockpile or underground.
		Action	<ul style="list-style-type: none"> Implement Spontaneous Combustion Management Plan. Activate emergency sealing systems if underground. Continue reviewing real time monitoring. Remove and/or isolate spontaneous combustion event if possible. Review results of spontaneous combustion propensity testing.
		Responsible Persons	Manager: Environment and Community, Open Cut Mine Manager, Technical Services Manager, Mining Engineering Manager, General Manager
Final Landform Surface	Tailings storage facility capping fails resulting in discharge to environment/watercourse.	Trigger	<ul style="list-style-type: none"> Monitoring confirms inert material of >2 m coverage over tailings is not being achieved. Final landform slope grades are >1%. Capping layer final landform shape is not compatible with surrounding landscape. Surface water or groundwater monitoring identifies adverse results which are attributed to discharge of tailings. Differential flow meter identifies a leak in tailings pipeline.
		Action	<ul style="list-style-type: none"> Increase volume of compacted inert minimum coverage of 2 m when creating final landform (or greater if required by final capping design specifications). Continue monitoring to confirm compacted inert material coverage of 2 m (or greater) is being achieved. Re-profile final landform to achieve drainage grades of <1% and compatibility with surrounding landscape. Increase surface water and/or groundwater monitoring frequency. Implement remediation strategies in consultation with relevant stakeholders. Review tailings capping application procedure.
		Responsible Persons	Manager: Environment and Community, Project Capital Engineer and Open Cut Mine Manager

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Final Landform Surface (Continued)	Large rocks on surface.	Trigger	<ul style="list-style-type: none"> Rock > 200 mm in diameter identified on surface of final landform.
		Action	<ul style="list-style-type: none"> Rock raking of the final landform completed to remove rocks >200 mm in diameter.
		Responsible Persons	Manager: Environment and Community
Landform and Land Use	Excessive slope lengths.	Trigger	<ul style="list-style-type: none"> Slope lengths >80 m limit at slope angles of 10°.
		Action	<ul style="list-style-type: none"> If possible, undertake rectification works to reduce average slope lengths to approximately 50 m to 70 m when slope angles are 10°. 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	Manager: Environment and Community and Open Cut Mine Manager
	Steep slope gradients. Maximum height of final landforms greater than RL 160 m AHD.	Trigger	<ul style="list-style-type: none"> Final slope angle above >10° and may be considered inconsistent with pre-mining topography. Final dump height survey greater than RL 160 m AHD.
		Action	<ul style="list-style-type: none"> Regrade slopes to achieve <10°. Reduce dump height to RL 160 m 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 RR if landform is at risk of not achieving pre-mining topography as identified within the Project EIS.
		Responsible Persons	Manager: Environment and Community and Open Cut Mine Manager

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Vegetation	Poor establishment, excessive weeds, low species composition, mono-culture.	Trigger	<ul style="list-style-type: none"> Score obtained during annual monitoring round is less than Interim Performance Targets.
		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. 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	Manager: Environment and Community

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Vegetation (Continued)	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	Manager: Environment and Community
	Low ground cover. High exotic cover.	Trigger	<ul style="list-style-type: none"> • Monitoring identifies vegetative coverage <70% and/or individual bare areas >20 m². • Biometric monitoring confirms exotic cover >10%.
		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	Manager: Environment and Community

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Reponses
Vegetation (Continued)	Native tree and shrub seed not available to complete revegetation. Native pasture seed not available to complete revegetation.	Trigger	<ul style="list-style-type: none"> Insufficient or inadequate seed resource available to undertake revegetation.
		Action	<ul style="list-style-type: none"> Review available seed resource. Undertake Annual Seed Collection Program. Source additional seed from reputable local provider.
		Responsible Persons	Manager: Environment and Community
Discharges to Environment	Pollution of downstream watercourses. Impacts to other water users.	Trigger	<ul style="list-style-type: none"> Water runoff from rehabilitation areas exceeds EPL water quality limits. Water quality in the NWC Diversion exceeds WMP trigger values. Regional surface and/or ground water users affected.
		Action	<ul style="list-style-type: none"> Refer to WMP (for appropriate actions and responses).
		Responsible Persons	Manager: Environment and Community
Erosion and Sediment Control	Landform not stable. Failure of water management structures and ability to freely drain.	Trigger	<ul style="list-style-type: none"> Monitoring indicates gully and tunnel erosion present. Monitoring identifies rilling erosion >200 mm deep and/or >200 mm wide. Groundcover is <60%. No erosion or sediment controls in place. Erosion and sediment controls in place but are not 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	Manager: Environment and Community

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Subsidence	<p>Presenting an immediate safety or environmental hazard.</p> <p>Preventing attainment of final land use.</p> <p>Creek instability and/or hydraulic losses.</p> <p>Extensive water ponding impacting rehabilitation.</p>	Trigger	<ul style="list-style-type: none"> • Surface cracking presents either an immediate safety or environmental hazard (e.g. an erosion hazard or hazard to grazing stock) or risk to final land use. • Visual inspections have identified cracking with widths >50 mm. • Visual inspections have identified increased cracking, scouring and/or ponding in creeks as a result of subsidence (i.e. greater than approved impacts). • Increased leakage into underground workings from watercourses identified.
		Action	<ul style="list-style-type: none"> • Repair and rehabilitate cracking in accordance with the relevant Extraction Plan(s). • Carry out repairs to the NWC Diversion in accordance with the North Wambo Creek Diversion Detailed Rehabilitation Plan (Appendix C of the North Wambo Creek Diversion Management Plan) and relevant Extraction Plan(s). • Undertake drainage works to reduce ponding in accordance with the relevant Extraction Plan(s). • Repair creeks affected by subsidence and have their functionality and stability confirmed by a hydrological engineer (or equivalent).
		Responsible Persons	Manager: Environment and Community and Project Capital Engineer

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Decommissioning	Decommissioning has not removed all redundant services, infrastructure, carbonaceous material, wastes hazardous materials, sealing of mine and ventilation shafts etc. post-mine closure. Unauthorised access to underground workings.	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 closure has not been completed. • Identification of possible contaminants at mine closure and either removal or treatment has not been carried out. • Dewatering and removal of possible contaminants from selected mine water dams post-mine closure has not been carried out. • Decommissioning of tailings storage facility has not been carried out. • The site at post-mine closure presents an immediate risk to the environment and public safety.
		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 (e.g. ensure all underground portals sealed, appropriate signage/fencing of the site, etc.). • Refer to asset register and ensure all items have been removed (except where they are to be retained as part of the final land use. • Ensure all decommissioning activities are undertaken appropriately and by suitably qualified contractors.
		Responsible Persons	Manager: Environment and Community and Project Capital Engineer

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Terrestrial Fauna	Native species diversity is low in rehabilitation areas. High numbers of feral animals are identified in rehabilitation areas.	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.
		Action	<ul style="list-style-type: none"> • Review biometric scores to consider if management actions are required to improve 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	Manager: Environment and Community
Weather and Climatic Influences	Weather conditions not appropriate for establishing rehabilitation, resulting in delays to ecosystem establishment. Weather conditions (e.g. bushfire, drought, flooding, etc.) result in damage to rehabilitation.	Trigger	<ul style="list-style-type: none"> • Weather conditions delay rehabilitation establishment. • Weather damage in rehabilitation areas.
		Action	<ul style="list-style-type: none"> • Review available areas for rehabilitation and consider reprioritising areas unaffected by weather conditions (e.g. flooding). • 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	Manager: Environment and Community

Table 21: Rehabilitation Trigger Action Response Plan (Continued)

Rehabilitation Risk	Consequence/ Hazard	TARP Code	Contingency Responses
Performance Criteria	Current rehabilitation monitoring program and available data (to date) insufficient to develop quantifiable criteria for mine closure and relinquishment. Rehabilitation standards advance significantly during mine operation resulting in increased requirements for rehabilitation relinquishment.	Trigger	<ul style="list-style-type: none"> • Completion criteria or BCD benchmarks for rehabilitation are revised.
		Action	<ul style="list-style-type: none"> • Review RMP. • Review BMP. • Consider adopting revised rehabilitation standards or completion criteria where possible.
		Responsible Persons	Manager: Environment and Community

11 REVIEW, REVISION AND IMPLEMENTATION

11.1 REVIEW

In accordance with Clause 11, Schedule 8 of the *Mining Regulation 2016*, WCPL will amend the RMP as follows:

- To substitute the proposed version of the rehabilitation objectives and rehabilitation completion criteria (**Section 4**) and/or final landform and rehabilitation plan (**Section 5**) with the version approved by the Secretary.
- As a consequence of an amendment made to the rehabilitation objectives and rehabilitation completion criteria (**Section 4**) and/or final landform and rehabilitation plan (**Section 5**).
- To reflect any changes to the risk control measures in the RMP that are identified in a rehabilitation risk assessment.
- Whenever directed in writing to do so by the Secretary.

WCPL will ensure that the RMP remains current and relevant to ensure it defines the rehabilitation outcomes to be achieved in relation to the mining area and sets out the strategy to achieve those outcomes. This will be partly informed by ensuring that the effectiveness of the rehabilitation risk assessment and controls adopted in the life of mine progressive rehabilitation schedule and rehabilitation phases are routinely evaluated throughout the life cycle of the Project.

Whenever any foreseeable hazard is identified that presents a risk to achieving the rehabilitation objectives and rehabilitation completion criteria, or the final landform and rehabilitation plan, WCPL will update the rehabilitation risk assessment and RMP.

If necessary, WCPL will update this RMP to include more detailed mine closure activities as rehabilitation progresses. The review and updating of this RMP will include and be informed by (as relevant) additional stakeholder consultation. The results of any environmental performance monitoring undertaken during the Forward Program term will contribute to refining future RMPs.

In accordance with Condition D6, Schedule 2 of DA 305-7-2003, the RMP may be reviewed and, if necessary, revised, following the submission of the following:

- Annual Review;
- incident report;
- audit;
- updated or additional Management Plans prepared; or
- any modification to the conditions of the Development Consent.

11.2 IMPLEMENTATION

A general overview of the responsibility of the WCPL personnel who are responsible for the monitoring, review and implementation of this RMP is provided in **Table 22**.

Table 22: Rehabilitation Management Plan Responsibilities

Role	Responsibilities
General Manager	<ul style="list-style-type: none"> • Ensure adequate resource are available to WCPL personnel to facilitate the completion of responsibilities under this RMP. • Ensure the safety of WCPL employees and the public in relation to WCPL operations. • Approve and instruct implementation of remediation/corrective action/compensation, if necessary.
Mining Engineering Manager (Underground Mine Manager)	<ul style="list-style-type: none"> • Ensure the safety of WCPL employees and the public in relation to WCPL operations. • Ensure adequate resource are available for the implementation of remediation/corrective actions.
Technical Services Manager	<ul style="list-style-type: none"> • Liaise with relevant stakeholders regarding subsidence impact management and related public safety hazards.
Manager: Environment and Community	<ul style="list-style-type: none"> • Liaise with relevant stakeholders regarding environmental management. • Ensure monitoring and reporting required in accordance with the RMP are carried out within specific timeframes, are adequately checked and processed and are prepared to the required standard. • Ensure that any Incident Reports are lodged in accordance with regulatory requirements with all available information. • Ensure that reviews of the RMP and other plans are conducted.

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ATTACHMENT 1
REHABILITATION RISK ASSESSMENT

Wambo Phase 2 Rehabilitation Management Plan Risk Assessment

ID	Date	Name	Role	Experience	Qualifications
1	15/07/2020	Peter Jaeger (WCPL)	Manager: Environment and Community, Acting Manager Health Safety and Training	Over 10 years in energy sector.	B Env Sc, Grad Cert Agri Business
2	15/07/2020	Nicole Dobbins (WCPL)	Senior Environmental Advisor	Over 17 years experience in environmental management and project approvals in the resource industry.	Bachelor of Science (Environment Biology)
3	15/07/2020	Michael Berry (WCPL)	Technical Services Manager	TBA	TBA
4	15/07/2020	Eugene Luyke (WCPL)	Technical Services Superintendent (Open Cut)	Approximately 20 years in mining industry.	Btech Engineering
5	15/07/2020	Matthew Copeland (Resources Strategies)	Environmental Project Manager	Over 5 years of experience in environmental management and project approvals in the resource industry.	Bachelor of Engineering (Civil and Geotechnical)
6	15/07/2020	Elijah Butler (Resource Strategies)	Environmental Project Manager	2 years of experience in environmental management and project approvals in the resource industry.	Bachelor of Engineering (Chemical and Environmental)

ID	ID	Mine Closure / Rehabilitation Aspect	Risk Source	Potential Events / Consequences	Consequence Category	Ranking Without Controls				Existing / Proposed Risk Treatment / Control	Action	Person Responsible for Action	Ranking With Controls				Is Risk ALARP with Controls?
						Consequence	Likelihood	Existing Risk	Risk Level				Consequence	Likelihood	Existing Risk	Risk Level	
1	1	General	Insufficient skills and experience of rehabilitation personnel.	Rehabilitation inadequate, sign off not received from RR and relinquishment not successful.	Finance / Reputation (ranked on Finance)	25	3	75	Med	Experienced rehabilitation contractors. QA/QC Processes. Rehabilitation Management Plan. Biodiversity Management. Monitoring programs. Regulator consultation and/or audits.	-	-	25	2	50	Med	Yes
1	2	General	Lack of clearly defined responsibilities.	Rehabilitation inadequate, sign off not received from RR and relinquishment not successful.	Finance / Reputation (ranked on Finance)	25	3	75	Med	Experienced rehabilitation contractors. QA/QC Processes. Rehabilitation Management Plan. Biodiversity Management Plan. Monitoring programs. Regulator consultation and/or audits. Clearly defined responsibilities between WCPL, contractors and Glencore/United to be captured in RACI - Who's responsible, who's accountable, who's consulted, who's informed.	Complete RACI Table.	Peter Jaeger	25	2	50	Med	Yes
1	3	General	Insufficient funding for or prioritisation of rehabilitation activities.	Rehabilitation inadequate, sign off not received from RR and relinquishment not successful. Lack of regulator confidence resulting in issues with other approvals.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes
1	4	General	Discrepancies between commitments made by WCPL and Glencore with regards to rehabilitation outcomes and/or closure criteria.	Sign off not received from RR and relinquishment delayed.	Reputation	5	2	10	Low	Rehabilitation Management Plan. Biodiversity Management Plan. Clearly defined responsibilities between WCPL, contractors and Glencore/United to be captured in RACI - Who's responsible, who's accountable, who's consulted, who's informed. Regulator consultation and/or audits.	Complete RACI Table.	Peter Jaeger	2	2	4	Low	Yes
1	5	General	Code of Practice: Rehabilitation Management Plan for Large Mines remains a consultation draft and is not finalised.	Compliance requirements increase in excess of current requirements in draft Guideline.	Finance	10	2	20	Low - Med	Stakeholder consultation.	-	-	10	2	20	Low - Med	Yes
2	1	Land Clearance	Pre-operation site conditions and environmental values (e.g. over-grazing, clearing, weeds, etc.).	Low baseline quality of rehabilitation areas, requiring additional efforts to meet completion criteria.	Finance / Environmental (ranked on Finance)	5	3	15	Low - Med	Annual monitoring programs, 2003 EIS record of land quality pre-mining. Importing of topsoil or organic matter to improve land quality. Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast.	-	-	5	2	10	Low	Yes
2	2	Land Clearance	Loss of biological and habitat resources (e.g. subsoil, topsoil, vegetative material, seedbank, rocks, etc.) through clearing, salvage and handling practices.	High quality vegetation / habitat resources lost through poor land clearance activities.	Environmental	2	3	6	Low	Minimal future land clearance to occur for Wambo in Phase 2. Topsoil Management Procedure. Surface Disturbance Permit. Vegetation and Burrow Clearing Protocol.	-	-	2	2	4	Low	Yes
2	3	Land Clearance	Clearing in inappropriate seasonal conditions to salvage biological resources.	High quality vegetation / habitat resources lost through poor land clearance activities.	Environmental	2	3	6	Low	Minimal future land clearance to occur for Wambo in Phase 2. Topsoil Management Procedure. Surface Disturbance Permit. Vegetation and Burrow Clearing Protocol.	-	-	2	2	4	Low	Yes
2	4	Land Clearance	Lack of topsoil or poor topsoil management practices (e.g. topsoil and subsoil not separated, topsoil not stockpiled appropriately, etc.).	Insufficient/inadequate topsoil resources to rehabilitate requiring importation of additional resources.	Finance	10	5	50	Med	Topsoil Management Procedure. Topsoil stockpiles maintained on site. Topsoil volume required for closure adequately assessed in Internal ARO.	-	-	10	5	50	Med	Yes
3	1	Active Mining/ Production	Contamination resulting from associated activities (e.g. storage and use of hydrocarbons/chemicals, drilling fluids, spillage of dirty or produced saline water, brine, sewage, etc.).	Discharge to environment/watercourses. Land contamination. Land remediation costs.	Environmental	2	3	6	Low	Double layered storages, hardstand areas, inspections undertaken regularly. Groundwater and surface water monitoring programs (Water Management Plan).	-	-	2	2	4	Low	Yes
3	2	Active Mining/ Production	Impoundment/co-disposal of unconsolidated/supernatant processing waste materials such as tailings and coarse reject materials.	Discharge to environment/watercourses. Land contamination. Land remediation costs.	Environmental	10	2	20	Low - Med	Contained within site catchment area or double skinned pipeline. Tailings dam and infrastructure inspection regime. Differential flow meters to monitor pipelines (i.e. leak detection).	-	-	10	2	20	Low - Med	Yes
3	3	Active Mining/ Production	Adverse geochemical/ chemical composition of materials such as overburden/ interburden, processing wastes, subsoils and topsoils and imported cover materials.	Poor quality rehabilitation outcomes if imported topsoil was below standard. Poor quality runoff from rehabilitated surfaces effecting water quality.	Environmental	10	2	20	Low - Med	On site material not particularly prone to AMD or geochemical issues. Imported material (if required) would be checked for quality.	-	-	10	2	20	Low - Med	Yes
3	4	Active Mining/ Production	Materials prone to spontaneous combustion (product stockpile PAD).	Spontaneous combustion event.	Financial	50	2	100	Med	Spon Com. Propensity testing. Spontaneous Combustion Management Plan. Stockpile management.	PJ to follow up existing controls for spon com events.	Peter Jaeger	10	2	20	Low - Med	Yes
3	5	Active Mining/ Production	Materials prone to spontaneous combustion (underground event).	Spontaneous combustion event.	People	50	3	150	Med - High	Spontaneous Combustion Management Plan. Real time monitoring and control room operator monitoring alarm system. Emergency sealing systems. Spon Com. Propensity testing.	-	-	50	2	100	Med	Yes

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						Consequence	Likelihood	Existing Risk	Risk Level				Consequence	Likelihood	Existing Risk	Risk Level	
4	1	Decommissioning	Impacts on European/ historic heritage items.	Discrepancy between commitments and expectations. Damage to heritage items.	Financial	10	3	30	Low - Med	Heritage Management Plan. UWJV Blast Management Plan. Competent drill and blasting engineering to limit vibration within consent limits. Ongoing maintenance works. Induction. Fenced and signed.	-	-	5	2	10	Low	Yes
4	2	Decommissioning	Impacts on Aboriginal heritage items.	Damage to heritage items.	Reputation	5	2	10	Low	AHIMS records. AHIPs. Heritage Management Plan. Due diligence assessments. Surface Disturbance Permits.	-	-	5	2	10	Low	Yes
4	3	Decommissioning	Contamination resulting from associated activities (e.g. storage and use of hydrocarbons/chemicals, drilling fluids, spillage of dirty or produced saline water, brine, sewage, etc.).	Refer Item 3.1.	Environmental	2	3	6	Low		-	-	2	2	4	Low	Yes
4	4	Decommissioning	Generation of waste products from demolition process (e.g. conveyors, electrical substations, compressors, services [pipes/cables], stores, laydown areas, etc.).	Inappropriate management of waste products.	Environmental	5	3	15	Low - Med	Experienced contractors for demolition works. Waste management processes implemented and reviewed. Inspections of demolition works after completion.	-	-	2	2	4	Low	Yes
4	5	Decommissioning	Groundwater accumulation or reinjection in former underground workings (e.g. potential for fill and spill or impacts to regional groundwater users).	Contamination of groundwater system with saline water. Impacts to regional users.	Environmental	10	3	30	Low - Med	Groundwater monitoring program. Water Management Plan. Dewatering systems in place. Detailed groundwater modelling. TARPs around groundwater levels and/or quality. Depth of workings.	-	-	10	2	20	Low - Med	Yes
4	6	Decommissioning	Adverse geotechnical and or geochemical issues associated with process waste storage facilities (e.g. spontaneous combustion).	Refer Item 3.4.	Financial	10	2	20	Low - Med	Refer Item 3.4. Product coal removed at this stage as into decommissioning.	Refer Item 3.4	PJ	10	2	20	Low - Med	Yes
4	7	Decommissioning	Unauthorised access to underground workings, habitation of structures, underground workings etc. by native fauna (e.g. bats).	Harm to native fauna.	Environmental	2	3	6	Low	All underground mine portals and ventilation shafts have been sealed in accordance with MDG6001 (Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams). Liability calculator used by Wambo Coal to assess financial costs.	-	-	2	2	4	Low	Yes
4	8	Decommissioning	Unauthorised access to underground workings, habitation of structures, underground workings etc. by members of the public (e.g. squatters).	Harm to persons.	People	25	3	75	Med	All underground mine portals and ventilation shafts have been sealed in accordance with MDG6001 (Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams). Liability calculator used by Wambo Coal to assess financial costs. Remotely located site.	-	-	10	2	20	Low - Med	Yes
4	9	Decommissioning	Failure to remove all infrastructure that is not to be retained post-closure (e.g. services, infrastructure, roads, carparks, hardstand areas, concrete footings).	Sign off not received from RR and relinquishment delayed.	Compliance / Financial	5	2	10	Low	Site inspections, review of infrastructure, identification of likely contaminated areas. Internal ARO (Asset Requirement Obligations) calculator. Triannual decommissioning assessment.	-	-	5	2	10	Low	Yes
4	10	Decommissioning	Failure to remove all hazardous materials (e.g. carbonaceous material on the surface, hazardous wastes, other wastes).	Sign off not received from RR and relinquishment delayed.	Compliance / Financial	5	2	10	Low	Site inspections, review of infrastructure, identification of likely contaminated areas. Internal ARO (Asset Requirement Obligations) calculator. Triannual decommissioning assessment.	-	-	5	2	10	Low	Yes
4	11	Decommissioning	Land contamination sites not successfully identified or remediated resulting in impacts to the environment.	Sign off not received from RR and relinquishment delayed.	Compliance / Financial	5	2	10	Low	Site inspections, review of infrastructure, identification of likely contaminated areas. Internal ARO (Asset Requirement Obligations) calculator. Triannual decommissioning assessment.	-	-	5	2	10	Low	Yes
4	12	Decommissioning	Ventilation shafts not sealed adequately.	Refer Items 4.7 and 4.8.	People	25	3	75	Med	All underground mine portals and ventilation shafts have been sealed in accordance with MDG6001 (Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams). Liability calculator used by Wambo Coal to assess financial costs. Remotely located site.	-	-	10	2	20	Low - Med	Yes
5	1	Landform Establishment	Use of inappropriate rehabilitation machinery and equipment.	Landform failure. Unable to achieve completion criteria. Damage to existing vegetation/rehabilitation.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Experienced rehabilitation contractors. QA/QC Processes. Rehabilitation Management Plan. Biodiversity Management Plan. Monitoring programs. Regulator consultation and/or audits. Clearly defined responsibilities between WCPL, contractors and Glencore/United to be captured in RACI - Who's responsible, who's accountable, who's consulted, who's informed.	Complete RACI Table.	Peter Jaeger	5	2	10	Low	Yes
5	2	Landform Establishment	Failure of borehole or gas well seals.	Resealing of boreholes or gas wells required. Oxygen ingress to underground workings. Impacts to rehabilitation equipment.	People	5	2	10	Low	All bores/gas wells to be capped and sealed in accordance with appropriate guidelines.	-	-	5	2	10	Low	Yes

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						Consequence	Likelihood	Existing Risk	Risk Level				Consequence	Likelihood	Existing Risk	Risk Level	
5	3	Landform Establishment	Instability of highwall and lowwalls.	Landform failure. Inability to meet final landform criteria.	Financial	10	2	20	Low - Med	Engineering design standards. Ongoing monitoring of landform stability.	-	-	5	2	10	Low	Yes
5	4	Landform Establishment	Availability of suitable materials for capping of hazardous materials and impounded tailings.	N/A to Wambo Phase 2 Operation as United will manage landform establishment for tailings.													
5	5	Landform Establishment (i.e. not active mine site).	Final landform instability (e.g. steep slopes, erosion etc.) affecting final land use capability.	Refer 5.3.	Financial	10	2	20	Low - Med	Annual monitoring, erosion and sediment control inspections, LIDAR monitoring. Ongoing maintenance. Slopes to be no greater than 1:6 (10 degrees or 17%) across the entire ML area (unless otherwise agreed by RR). Slope length within range of 50 m – 80 m (subject to slope gradient). Preferred option: 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. Profile if unable to achieve preferred option: 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.	-	-	5	2	10	Low	Yes
5	6	Landform Establishment	Final landform unsuitable for final land use (e.g. large rocks present affecting cultivation, settlement and surface subsidence leading to extended ponding etc.).	Refer Item 1.3.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes
5	7	Landform Establishment	Adoption of inappropriate or inadequate rehabilitation techniques, including equipment fleet.	Refer Item 1.3.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes
5	8	Landform Establishment	Landform aspect not suitable for intended target plant species.	Refer Item 1.3.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes
5	9	Landform Establishment	Diversion of surface water runoff away from catchment areas.	Reduced flow in creeks.	Environmental	2	3	6	Low	Water Management Plan. Site Water Management System. Surface water monitoring program. Groundwater monitoring program. Impacts assessed through EIS/EA process. Final landform designed to meet appropriate standards and minimise catchment areas. Groundwater modelling of predicted take.	-	-	2	2	4	Low	Yes
5	10	Landform Establishment	Groundwater accumulation in voids.	Refer Item 4.5.	Environmental	10	3	30	Low - Med	Groundwater monitoring program. Water Management Plan. Dewatering systems in place. Detailed groundwater modelling. TARPs around groundwater levels and/or quality. Depth of workings.	-	-	10	2	20	Low - Med	Yes
5	11	Landform Establishment	Groundwater accumulation in underground workings.	Refer Item 4.5.	Environmental	10	3	30	Low - Med	Groundwater monitoring program. Water Management Plan. Dewatering systems in place. Detailed groundwater modelling. TARPs around groundwater levels and/or quality. Depth of workings.	-	-	10	2	20	Low - Med	Yes
5	12	Landform Establishment	Watercourse diversion instability affecting riparian health.	Rehabilitation fails to be established, resulting in sign off not being received from RR and relinquishment not successful.	Financial	10	3	30	Low - Med	Implementation of North Wambo Creek Diversion Action Plan. Stakeholder consultation.	-	-	5	2	10	Low	Yes
5	13	Landform Establishment	Water availability, on and off site.	Insufficient water available to support landform establishment.	Financial	5	3	15	Low - Med	Water Management Plan. Biodiversity Management Plan. Consideration of water requirements when designing final landforms. Species selection for site conditions. Undertake establishment during appropriate seasons.	-	-	5	2	10	Low	Yes
5	14	Landform Establishment	Rehabilitated landforms are not designed to shed water safely without causing excessive erosion, jeopardising landform geotechnical integrity or increasing pollution of downstream watercourses.	Refer Item 5.3.	Financial	10	2	20	Low - Med	Engineering design standards. Ongoing monitoring of landform stability.	-	-	5	2	10	Low	Yes

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						Consequence	Likelihood	Existing Risk	Risk Level				Consequence	Likelihood	Existing Risk	Risk Level	
5	15	Landform Establishment	Final landforms are not consistent with and do not complement the topography of the surrounding region.	Risk of regulator not signing off on rehabilitation.	Financial	5	2	10	Low	Final landform design will consider topography of surrounding region, and will be based on surrounding natural landforms. Consultation with stakeholders.	-	-	5	2	10	Low	Yes
5	16	Landform Establishment	Creek diversion unstable and presents a safety hazard.	Refer Item 5.3.	Financial	10	2	20	Low - Med	Engineering design standards. Ongoing monitoring of landform stability.	-	-	5	2	10	Low	Yes
6	1	Growth Medium Development	Use of inappropriate rehabilitation machinery and equipment.	Refer Item 5.1.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Experienced rehabilitation contractors. QA/QC Processes. Rehabilitation Management Plan. Biodiversity Management Plan. Monitoring programs. Regulator consultation and/or audits. Clearly defined responsibilities between WCPL, contractors and Glencore/United to be captured in RACI - Who's responsible, who's accountable, who's consulted, who's informed.	Complete RACI Table.	Peter Jaeger	5	2	10	Low	Yes
6	2	Growth Medium Development	Soil compaction from mining activities.	Refer Item 2.4.	Financial	10	3	30	Low - Med	Refer Item 2.4. Ripping to be carried out to break up compaction. Incorporation of soil ameliorants and organic matter.	-	-	10	2	20	Low - Med	Yes
6	3	Growth Medium Development	Subsoil and topsoil deficit for rehabilitation activities.	Refer Item 2.4.	Financial	10	5	50	Med	Refer Item 2.4. Ripping to be carried out to break up compaction. Incorporation of soil ameliorants and organic matter.	-	-	10	5	50	Med	Yes
6	4	Growth Medium Development	Substrate inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, lack of soil biota, adverse soil chemical properties, exposed hostile geochemical materials, and any other factors impeding the effective rooting depth).	Refer Item 2.4.	Financial	10	3	30	Low - Med	Refer Item 2.4. Ripping to be carried out to break up compaction. Incorporation of soil ameliorants and organic matter.	-	-	10	2	20	Low - Med	Yes
7	1	Ecosystem Establishment	Lack of availability and quality of seed resources, including genetic integrity.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	10	2	20	Low - Med	Annual seed collection program. Biodiversity Management Plan - annual flora monitoring program. Reputable supplier.	-	-	10	2	20	Low - Med	Yes
7	3	Ecosystem Establishment	Ant and insect predation of seed.	Refer Item 7.1.	Financial	10	2	20	Low - Med	Annual seed collection program. Biodiversity Management Plan - annual flora monitoring program. Reputable supplier.	-	-	10	2	20	Low - Med	Yes
7	4	Ecosystem Establishment	Damage to seed by mixing with fertilisers.	Refer Item 7.1.	Financial	10	2	20	Low - Med	Annual seed collection program. Biodiversity Management Plan - annual flora monitoring program. Reputable supplier.	-	-	10	2	20	Low - Med	Yes
7	5	Ecosystem Establishment	Use of inappropriate rehabilitation machinery and equipment.	Refer Item 5.1.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Experienced rehabilitation contractors. QA/QC Processes. Rehabilitation Management Plan. Biodiversity Management Plan. Monitoring programs. Regulator consultation and/or audits. Clearly defined responsibilities between WCPL, contractors and Glencore/United to be captured in RACI - Who's responsible, who's accountable, who's consulted, who's informed.	Complete RACI Table.	Peter Jaeger	5	2	10	Low	Yes
7	6	Ecosystem Establishment	Lack of resources for rehabilitation maintenance.	Refer Item 1.3.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes
7	7	Ecosystem Establishment	Weed infestation associated with both introduction and control (or lack thereof).	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	10	2	20	Low - Med	Completion criteria - Biometric monitoring confirms exotic cover <33%. Biodiversity Management Plan - annual flora monitoring program. Weed management program.	-	-	10	2	20	Low - Med	Yes
7	8	Ecosystem Establishment	Lack of structural integrity of buildings and infrastructure to be retained in final land use.	Collapse/failure of infrastructure to be retained (e.g. dams).	Environmental	2	2	4	Low	Water infrastructure built and managed to applicable design standards. Surface water monitoring. Erosion and sediment controls.	-	-	2	2	4	Low	Yes
7	9	Ecosystem Establishment	Damage from fauna (e.g. kangaroos, feral goats, etc.) and livestock.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	10	2	20	Low - Med	Annual feral animal control program implemented. Ecological monitoring confirms feral animal control program effective. Biodiversity Management Plan - annual flora monitoring program.	-	-	5	2	10	Low	Yes
7	10	Ecosystem Establishment	Lack of infrastructure to support intended final land use (e.g. dams, fences, watering facilities, etc.). Note: Intended final land uses are native vegetation or grazing, minimal infrastructure required.	Farm dams retained insufficient to support grazing and additional dams required.	Environmental	2	2	4	Low	Water infrastructure built and managed to applicable design standards. Surface water monitoring. Erosion and sediment controls. Consideration in final landform design.	-	-	2	2	4	Low	Yes
7	11	Ecosystem Establishment	Adoption of inappropriate or inadequate rehabilitation techniques, including equipment fleet.	Refer Item 5.1.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes

ID	ID	Mine Closure / Rehabilitation Aspect	Risk Source	Potential Events / Consequences	Consequence Category	Ranking Without Controls				Existing / Proposed Risk Treatment / Control	Action	Person Responsible for Action	Ranking With Controls				Is Risk ALARP with Controls?
						Consequence	Likelihood	Existing Risk	Risk Level				Consequence	Likelihood	Existing Risk	Risk Level	
7	12	Ecosystem Establishment	Inappropriate revegetation species mix for targeted final land use.	Rehabilitation fails to meet completion criteria, resulting in additional works being required.	Financial	10	2	20	Low - Med	Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken. Annual seed harvest program. Reputable seed provider.	-	-	10	1	10	Low	Yes
7	13	Ecosystem Establishment	Weather and climatic influences (e.g. drought, intense rainfall events, bushfire, etc.).	Weather conditions are not appropriate for establishing rehabilitation, resulting in overall delays. Weather conditions result in damage to rehabilitation, resulting in additional works being required to meet criteria.	Financial	10	3	30	Low - Med	Mitigation actions have been implemented as required by the Bushfire Management Plan.	-	-	10	3	30	Low - Med	Yes
7	14	Ecosystem Establishment	Insects and plant disease.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	10	2	20	Low - Med	Biodiversity Management Plan - annual flora monitoring program. Reputable seed supplier. Treatment program following identification.	-	-	5	2	10	Low	Yes
7	15	Ecosystem Establishment	Lack of integration of native ecosystems with agricultural ecosystems.	Rehabilitation fails to meet completion criteria, resulting in additional works being required.	Financial	10	2	20	Low - Med	Rehabilitation Management Plan. Biodiversity Management Plan. Consultation with stakeholders regarding final land uses. Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken.	-	-	5	2	10	Low	Yes
7	16	Ecosystem Establishment	Insufficient establishment of target species and limited species diversity.	Refer Item 7.12.	Financial	10	2	20	Low - Med	Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken. Annual seed harvest program. Reputable seed provider.	-	-	10	1	10	Low	Yes
7	17	Ecosystem Establishment	Limited vegetation structural development and habitat for targeted fauna species.	Refer Item 7.12.	Financial	10	2	20	Low - Med	Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken. Annual seed harvest program. Reputable seed provider.	-	-	10	1	10	Low	Yes
7	18	Ecosystem Establishment	Erosion and failure of drainage and water management/ storage structures.	Erosion of landform. Collapse/failure of infrastructure to be retained (e.g. dams).	Environmental	2	2	4	Low	Water infrastructure built and managed to applicable design standards. Surface water monitoring. Erosion and sediment controls.	-	-	2	2	4	Low	Yes
7	19	Ecosystem Establishment	Overgrazing of pasture rehabilitation areas.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	10	2	20	Low - Med	Biodiversity Management Plan - annual flora monitoring program. Livestock management practices.	-	-	5	2	10	Low	Yes
7	20	Ecosystem Establishment	Poor water quality discharges (e.g. acid-drainage, high salinity, etc.).	Impact to receiving environment.	Environmental	2	2	4	Low	Water infrastructure built and managed to applicable design standards. Surface water monitoring. Erosion and sediment controls. Consideration in final landform design. EPL conditions.	-	-	2	2	4	Low	Yes
7	21	Ecosystem Establishment	Poor seed viability, seed dormancy.	Refer Item 7.1.	Financial	10	2	20	Low - Med	Annual seed collection program. Biodiversity Management Plan - annual flora monitoring program. Reputable supplier.	-	-	10	2	20	Low - Med	Yes
7	22	Ecosystem Establishment	Excessive water discharges.	Exceeding allowed discharge volume resulting in non-compliance with EPL.	Compliance	5	2	10	Low	Water infrastructure built and managed to applicable design standards. Surface water monitoring. Erosion and sediment controls. Consideration in final landform design. EPL conditions.	-	-	5	2	10	Low	Yes
7	23	Ecosystem Establishment	Woodland Corridor and Mixed Woodland/Pasture Areas established are not consistent with revegetation strategy.	Refer Item 7.12.	Financial	10	2	20	Low - Med	Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken. Annual seed harvest program. Reputable seed provider.	-	-	10	1	10	Low	Yes
7	24	Ecosystem Establishment	Established woodland vegetation does not link remnant vegetation to the north and east of the Project with the eastern borders of Wollemi National Park.	Revegetation does not form a corridor for wildlife.	Financial	5	2	10	Low	Revegetation areas planned and planted in accordance with commitments. Biodiversity Management Plan - annual flora monitoring program. Consultation with stakeholders. Progressive rehabilitation.	-	-	5	2	10	Low	Yes
7	25	Ecosystem Establishment	Pasture species established consistent with revegetation strategy.	Refer Item 7.12.	Financial	10	2	20	Low - Med	Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken. Annual seed harvest program. Reputable seed provider.	-	-	10	1	10	Low	Yes
7	26	Ecosystem Establishment	Tree species established along creek line are not consistent with riparian zone.	Suitable environment not established.	Environmental	5	3	15	Low - Med	Implementation of North Wambo Creek Diversion Action Plan (Revegetation Strategy). Stakeholder consultation. Revegetation areas planned and planted in accordance with commitments. Biodiversity Management Plan - annual flora monitoring program.	-	-	2	3	6	Low	Yes
8	1	Ecosystem and Land Use Development	Weather and climatic influences (e.g. drought, intense rainfall events, bushfire, etc.).	Refer Item 7.13.	Financial	10	3	30	Low - Med	Mitigation actions have been implemented as required by the Bushfire Management Plan.	-	-	10	3	30	Low - Med	Yes
8	2	Ecosystem and Land Use Development	Vandalism to revegetation areas.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	2	2	4	Low	Site security. Biodiversity Management Plan - annual flora monitoring program. Signage and fencing.	-	-	2	1	2	Low	Yes

ID	ID	Mine Closure / Rehabilitation Aspect	Risk Source	Potential Events / Consequences	Consequence Category	Ranking Without Controls				Existing / Proposed Risk Treatment / Control	Action	Person Responsible for Action	Ranking With Controls				Is Risk ALARP with Controls?
						Consequence	Likelihood	Existing Risk	Risk Level				Consequence	Likelihood	Existing Risk	Risk Level	
8	3	Ecosystem and Land Use Development	Inadvertent or unauthorised access by mining equipment and vehicles.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	2	2	4	Low	Site security. Biodiversity Management Plan - annual flora monitoring program. Signage and fencing.	-	-	2	1	2	Low	Yes
8	4	Ecosystem and Land Use Development	Post-closure water quality issues (e.g. acid-drainage, high salinity, etc.).	Refer Item 7.20.	Environmental	2	2	4	Low	Water infrastructure built and managed to applicable design standards. Surface water monitoring. Erosion and sediment controls. Consideration in final landform design. EPL conditions.	-	-	2	2	4	Low	Yes
8	5	Ecosystem and Land Use Development	Insects and plant disease.	Refer Item 7.14.	Financial	10	2	20	Low - Med	Biodiversity Management Plan - annual flora monitoring program. Reputable seed supplier. Treatment program following identification.	-	-	5	2	10	Low	Yes
8	6	Ecosystem and Land Use Development	Overgrazing of pasture rehabilitation areas.	Refer Item 7.19.	Financial	10	2	20	Low - Med	Biodiversity Management Plan - annual flora monitoring program. Livestock management practices.	-	-	5	2	10	Low	Yes
8	7	Ecosystem and Land Use Development	Lack of resources for rehabilitation maintenance.	Refer Item 1.3.	Finance / Reputation (ranked on Finance)	10	3	30	Low - Med	Internal ARO (Asset Requirement Obligations) calculator. Liability calculator used by Wambo Coal to assess financial costs. RCE. Internal budgeting to include rehabilitation activities - five year forecast. Regulator consultation and/or audits. Rehabilitation Management Plan. Biodiversity Management Plan.	-	-	5	2	10	Low	Yes
8	8	Ecosystem and Land Use Development	Re-disturbance of established rehabilitation areas.	Rehabilitation fails to be established, resulting in additional works being required to meet completion criteria.	Financial	2	2	4	Low	Biodiversity Management Plan - annual flora monitoring program. Signage and fencing.	-	-	2	1	2	Low	Yes
9	1	Mine Subsidence Affected Areas	Extended water ponding in excess of approved impacts.	Rehabilitation or existing vegetation are impacted by ponding.	Financial	5	3	15	Low - Med	Subsidence assessments, geomorphology assessments, EIS/EA predictions. Subsidence Monitoring Program. Rehabilitation Management Plan.	-	-	5	3	15	Low - Med	Yes
9	2	Mine Subsidence Affected Areas	Re-direction of creek and river flows inconsistent with predicted impacts.	Effects vegetation along previous alignment. Changes to sediment load.	Environmental	2	3	6	Low	Biodiversity Management Plan - annual flora monitoring program. Repair of flow path if required. Extraction Plan - Geomorphology Assessment.	-	-	2	3	6	Low	Yes
9	3	Mine Subsidence Affected Areas	Subsidence cracking and sink holes.	Cracking presents a risk to the environment, safety and/or the final land use objectives.	Environmental / People / Financial (ranked on Financial)	10	3	30	Low - Med	Remediation of surface cracks >50 mm wide. Biodiversity Management Plan - annual flora monitoring program. Extraction Plan. Subsidence assessments. Limited access to site.	-	-	5	3	15	Low - Med	Yes
9	4	Mine Subsidence Affected Areas	Inter-connective cracking with underground workings.	Loss of surface flows to underground workings.	Environmental	2	3	6	Low	Remediation of surface cracks >50 mm wide. Extraction Plan. Subsidence assessments. Subsidence monitoring program. Groundwater monitoring program. Surface water monitoring program.	-	-	2	3	6	Low	Yes
9	5	Mine Subsidence Affected Areas	Interference with tree roots.	Rehabilitation or existing vegetation are impacted by cracking.	Environmental	2	2	4	Low	Remediation of surface cracks >50 mm wide. Biodiversity Management Plan - annual flora monitoring program. Extraction Plan. Subsidence assessments.	-	-	2	2	4	Low	Yes
9	6	Mine Subsidence Affected Areas	Impacts to aquifers and groundwater loss of water to water users including the environment.	Reduction of water availability in groundwater table.	Financial	5	2	10	Low	Groundwater monitoring program. Water Management Plan. Depressurisation from historic mining. Detailed groundwater modelling. TARPs around groundwater levels and/or quality. Depth of workings. Predicted impacts as described in EIS/EA documentation. Make good provisions for downstream users.	-	-	5	2	10	Low	Yes
9	7	Mine Subsidence Affected Areas	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.	Refer Item 9.3.	Environmental / People / Financial (ranked on Financial)	10	3	30	Low - Med	Remediation of surface cracks >50 mm wide. Biodiversity Management Plan - annual flora monitoring program. Extraction Plan. Subsidence assessments. Limited access to site.	-	-	5	3	15	Low - Med	Yes
9	8	Mine Subsidence Affected Areas	Watercourses subject to subsidence impacts are not hydraulically and geomorphologically stable.	Refer Item 9.2.	Environmental	2	3	6	Low	Biodiversity Management Plan - annual flora monitoring program. Repair of flow path if required. Extraction Plan - Geomorphology Assessment.	-	-	2	3	6	Low	Yes
9	9	Mine Subsidence Affected Areas	Riparian vegetation that is the same or better than prior to commencement of mining is not able to be established along watercourses subject to subsidence impacts.	Refer Item 7.25.	Financial	10	2	20	Low - Med	Revegetation species and target communities defined in EIS, RMP and BMP. Progressive review of rehabilitation as undertaken. Annual seed harvest program. Reputable seed provider.	-	-	10	1	10	Low	Yes

Likelihood	Likelihood description	Probability	Consequence					
			Low (1)	Minor (2)	Moderate (5)	Significant (10)	Major (25)	Catastrophic (50)
5 - Very Likely	Likely to occur repeatedly – Expected in the work team	10% - 100%	5	10	25	50	125	250
4 - Likely	Probably will occur several times - Expected at this location	1% - 10%	4	8	20	40	100	200
3 - Possible	Could occur intermittently - Expected within Peabody	0.1% - 1%	3	6	15	30	75	150
2 - Unlikely	Could occur but hardly ever - Expected within the mining industry	0.01% - 0.1%	2	4	10	20	50	100
1 - Rare	Improbable or unrealistic - Not expected in the mining industry but seen in other industries	< 0.01%	1	2	5	10	25	50

Consequence Category		Consequence descriptions					
		Low	Minor	Moderate	Significant	Major	Catastrophic
Harm to People	P	Near miss, near hit, no medical treatment, report only (RO)	Slightly injured, first aid treatment (FAI)	Medical treatment (MTI), disabling reversible impairment, restricted work (RWI) or lost time (LTI)	Serious bodily injury or disabling irreversible impairment, permanent partial disability (PPD)	Single fatality incident. Total and permanent disability (TPD). Major irreversible health effects	Multiple fatality incident. Major injury / disease among multiple employees
Environmental	E	Negligible or reversible environmental impact Nil to minor remediation (typically a shift) No breach of regulations or requirement to report to regulators	Minor reversible environmental impact, minor remediation (typically < 5 days) Non-compliances and breaches of regulation that may result in a citation (NOV) May require reporting to the regulators	Incident resulting in moderate reversible onsite and/or off-site impact causing short term effect. Moderate remediation required (typically a month) Non-compliances and breaches of regulation that may result in prosecution or citation or punitive fine. Requirement or obligation to report to the regulators	Incident resulting in significant onsite or off-site environmental impact causing medium to long term environmental harm Significant remediation required (typically less than 12 months) Significant legal issues, non-compliances and breaches of regulation that results in a prosecution or citation or fine Moderate litigation issues involving many weeks of senior management time	A major incident resulting in regional environmental impact causing long term environmental harm Major long term remediation required (greater than 12 months) Major litigation or prosecution resulting in long term interruption to operations or loss of licence at a site	Incident resulting in catastrophic widespread regional environmental harm causing disastrous effect Major long term remediation required (over multiple years) Major litigation or prosecution, Loss of License to operate at Multiple sites
Finance (higher of cost or NPV)	F	<\$10,000	\$10,000 - \$100,000	\$100,000 - \$1 mil	\$1 mil - \$20 mil	\$ 20 mil-\$100 mil	>\$100 mil
Impact on reputation	R	Minor impact, no public concern; Market cap impact < \$20 M (< \$0.07 per share)	Local media or public concern; Market cap impact \$20 M - \$30 M (\$0.07 - \$0.12 per share)	Regional media or public concern. Local criticism; Market cap impact \$30 M - \$100 M (\$0.12 - \$0.40 per share)	National adverse media or public criticism; Market cap impact \$100 M - \$250 M (\$0.40 - \$1.00 per share)	International adverse media or public criticism. International public concern; Market cap impact \$250 M - \$500 M (\$1.00 - \$1.85 per share)	Significant international public or media criticism or condemnation; Market cap impact > \$500 M (> \$1.85 per share)
Law / Compliance / regulatory	C	Minor, one-off violations of law, regulation, permit or policy; minimal fines, penalties or costs	Recurring or systemic minor violations of law, regulation, permit or policy	Violations of law, regulation, permit or policy with moderate fines or penalties, Moderate Litigation, MSHA imminent danger order or similar	Significant violation of law or permit with material fines, penalties or costs. Serious dispute with strategic customer. Major Litigation	Material Litigation. Serious investigation by SEC, DOJ or foreign equivalent. Code of Conduct violations	Criminal investigation or proceedings involving officers or directors. Litigation with allegations of executive fraud or misappropriation
Strategic risk	SR	Event does not have a meaningful impact to Strategic Outlook	Event does not have meaningful impact to Strategic Outlook, but may require further monitoring	Event may have a material impact on near-term outlook for a region or mine	Event has a material impact on strategic outlook for a region or basin that may require a change to operations to mitigate risk	Event causes mines in a region or basin to cease current operations	Event or threat such that BTU would cease to exist as an ongoing concern in coal operations

Risk Score	Notification	Level	Action (H&S)
<11	Crew / team	Same level	Develop a plan (formal or informal) with crew or continue with and established plan (SOP etc.) that ensures the task can be completed safely. Team should remain aware for changing conditions.
11 to 30	Supervisor	+1	Develop a formal safe action plan with supervisor and others within the crew (SOP) that identifies all known hazards and details what controls need to be in place and how the task should be performed to ensure it can be completed safely.
31 to 50	Area manager or site GM	+2	Conduct a formalized risk review of existing work process and controls. Explore additional control options that eliminate, substitute or reduce the risk. Monitor controls for effectiveness during the task.
51 - 100	BU Mgt	+3	Controls should be reviewed to ensure risk is as low as reasonably practicable (ALARP), critical controls must be identified and monitored for effectiveness. If risk is not at ALARP, additional controls must be identified and a plan developed for implementation.
101 to 199	ELT	+4	Controls should be added / improved and an additional risk assessment completed for activity to proceed.
200 or greater	CEO	+5	Controls should be added / improved and an additional risk assessment completed for activity to proceed.



ATTACHMENT 2

RECORD OF CONSULTATION WITH THE DEPARTMENT OF
PLANNING AND ENVIRONMENT



Peter Jaeger
Manager: Environment and Community
Wambo Coal Pty Ltd
PMB 1
Singleton NSW 2330

20/06/2022

Dear Mr Jaeger

Wambo Coal Mine (DA 305-7-2003)
Consultation for Rehabilitation Management Plan

I refer to your recent letter (dated 2 June 2022) seeking agreement of the Planning Secretary that the Wambo Coal Mine Rehabilitation Management Plan can be updated without consulting with the stakeholders listed in condition B108(b) of Schedule 2 of development consent DA 305-7-2003

The Department has carefully reviewed your request and agrees that, given the extensive consultation undertaken in 2020 and the minor nature of the proposed revisions, that consultation regarding the updated Rehabilitation Management Plan is not required.

Accordingly, the Planning Secretary agrees, in accordance with condition A24 of Schedule 2, that consultation with the public authorities listed in B108(b) of Schedule 2 is not required.

If you wish to discuss the matter further, please contact Joe Fittell on (02) 4908 6896.

Yours sincerely



Stephen O'Donoghue
Director
Resource Assessments
As nominee of the Planning Secretary



ATTACHMENT 3

STAKEHOLDER CONSULTATION COMPLETED FOR THE
WAMBO COAL MINE PHASE 2 – REHABILITATION MANAGEMENT PLAN
DECEMBER 2020 – DECEMBER 2023



**Evidence of Consultation for the Wambo Coal Mine Phase 2 – Rehabilitation Management Plan
December 2020 – December 2023**

(As displayed on the Major Projects Planning Portal 30 September 2020)

Public Authority Response Summary

NSW Resources Regulator (PAE-9049954)	
Status Pending Advice	Due Date Thursday, September 24, 2020
No response received	
Water Group (PAE-9049955)	
Status Closed	Due Date Thursday, September 24, 2020
Notes: Please send post approval requests to NRAR as Landuse Enquiries deal solely with Pre Approvals. nrar.servicedesk@industry.nsw.gov.au	
Biodiversity and Conservation Division (PAE-9052206)	
Status Pending Advice	Due Date Thursday, September 24, 2020
No response received	
Singleton Council (PAE-9052207)	
Status Pending Advice	Due Date Thursday, September 24, 2020
No response received	

Reconciliation of BCD Comments and WCPL Responses

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>1. BCD recommends that the plant species composition of rehabilitation vegetation in each quadrat is compared against the diagnostic species for the targeted Plant Community Type, and against the vegetation needs of specific threatened species.</p>	<p>Noted.</p>	<p>Table 16 has been updated to state: <i>In addition to the completion criteria below, flora species composition of woodland rehabilitation will be compared to the characteristic species in each target plant community type and against the vegetation needs of threatened woodland species known or predicted from the local area to identify the need for additional planting or seeding.</i></p>
<p>2. BCD recommends that rehabilitation completion is based on all monitoring sites meeting all completion criteria.</p>	<p>As average values are useful in describing the results of small sample sites located over a large area of the same or similar treatment, average values will be used for assessment against completion criteria where multiple sites sample rehabilitation of similar age and treatment. Individual site scores will also be reported, and investigation initiated at monitoring sites where completion criteria are not met to determine if low scores are representative of a broader area and additional actions are required.</p>	<p>Table 16 has been updated to state: <i>Average values will be used for assessment against completion criteria where multiple sites sample rehabilitation of similar age and treatment. Individual site scores will be reported and investigation initiated at sites where completion criteria are not met to determine if these poor scores are representative of a broader area and additional actions are required.</i></p>
<p>3. BCD recommends that exotic plant cover remains less than 10% cover within woodland rehabilitation areas.</p>	<p>Noted.</p>	<p>Tables 14, 15 and 16 have been updated to require exotic plant cover to be less than 10%. Table 26 has also been updated with a revised trigger requiring action to be taken if exotic cover is greater than 10%.</p>
<p>4. BCD recommends that wording in Table 11 is revised so that the rehabilitation objectives meet the SMART principles.</p>	<p>WCPL considers that the rehabilitation objectives provided in Table 11 are appropriate for the required purpose. More detailed completion criteria which are considered to follow the SMART principles more closely are provided in Table 12 to Table 16. The text in the RMP has been updated to clarify this.</p>	<p>Section 3.1 has been updated to state: <i>The rehabilitation objectives in Table 11 are considered to be broader objectives that cover specific aspects of rehabilitation. To complement these objectives, WCPL have developed performance indicators and preliminary completion criteria for each domain and rehabilitation phase based on the SMART principle.</i></p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>5. BCD recommends that the use of Landscape Function Analysis to measure landscape establishment is reconsidered in light of the recent paper by Erskine et al. (2013).</p>	<p>LFA forms one aspect of the monitoring program for the Wambo Coal Mine which currently includes regular LFA monitoring, Biometric monitoring, visual monitoring and subsidence inspections.</p> <p>WCPL is concerned that changing monitoring methods without a transition period may make it difficult to identify longer-term trends. WCPL therefore proposes a transition over the RMP term to phase out the LFA monitoring and transition to reliance solely on the other methods already implemented once a longer data period is available to draw meaningful trends.</p>	<p>Table 15 and Section 8.1.1 have been updated to include the following text:</p> <p><i>Over the RMP term, WCPL will review the use of LFA as a monitoring method and transition to alternative monitoring methods for rehabilitated landscape establishment which may include soil monitoring, Biometric Vegetation Assessment and visual assessment as detailed below. The RMP will be updated to reflect any changes to the monitoring methodology.</i></p>
<p>6. BCD recommends that the RMP includes a description on the objectives of the woodland rehabilitation corridors and the species that they are targeting.</p>	<p>Noted.</p> <p>Section 6.3.5 currently states:</p> <p><i>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.</i></p> <p><i>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.).</i></p>	<p>The text in Section 6.3.5 of the RMP has been updated to include the following (blue text):</p> <p><i>The revegetation program will include the use of food tree species for the Glossy Black-cockatoo (e.g. Allocasuarina sp.) and consider providing for the food and habitat needs of other threatened woodland species.</i></p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
7. BCD recommends that the ‘Threatened Species Management Protocol’ includes the requirement to record threatened species, when they are encountered, and details of where they were seen, the context and the outcome.	Noted. The TSMP will be updated to include the requirement to record threatened species, when they are encountered, and details of where they were seen, the context and the outcome.	No changes to the RMP are proposed.
8. BCD recommends that all Biometric field data collected in rehabilitation areas is provided in the Annual Review.	A summary of all biometric field data collected in rehabilitation areas will be provided annually in the Annual Rehabilitation Report and Forward Program.	No changes to the RMP are proposed.
9. BCD recommends that at least ten large rocks per hectare are left on the surface in the woodland rehabilitation areas are left to provide shelter for native plants and animals.	Noted. Section 6.3.1 of the RMP currently states: <i>Habitat augmentation involves the establishment of habitat structures within Management Domains. This includes requires the relocation of surplus trees and rocks removed from the Mine footprint for relocation as habitat structures within the Management Domains.</i> Table 21 requires WCPL to: <i>Use structures such as tree hollows, logs and other woody debris, rock material to augment the habitat value of rehabilitation.</i>	Table 15 of the RMP has been updated to clarify that habitat augmentation would include the use of large rocks (i.e. as well as timber resources).
10. BCD recommends that the completion criteria in Table 16 for BBAM site variables are clearly defined to enable a reader to know how they were derived.	Noted.	Table 16 has been updated to state: <i>The completion criteria below were developed using Table 3 in BioMetric 2.0 Operational Manual assessment methodology (NSW DECC, 2008) which was designed to score Biometric vegetation plots based on the difference between the measured values and the benchmark values for each PCT. Benchmark values were determined by OEH (at the time of development) for each PCT and these were adapted to create aspirational but achievable targets.</i>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
11. BCD recommends that the revegetation strategy referred to in the draft RMP is cited in full, and a copy is provided with the RMP.	The “revegetation strategy” is not a separate document but instead refers to the general rehabilitation methodologies outlined in Section 6.3 (in particular, Sections 6.3.5 and 6.3.6) of the RMP.	No changes to the RMP are proposed.
12. BCD recommends that the RMP includes the date of when Phase 2 of the Wambo Mine commences.	Phase 2 is anticipated to commence on 1 December 2020 (consistent with the proposed commencement of the RMP).	Commencement date of Phase 2 specifically added to Section 1.1.
13. BCD recommends that Section 1.3.2 is reworded to make clear that rehabilitation to pasture and woodland will be on-going during mining operations.	Noted. WCPL notes that Section 6.1 of the RMP states: <i>Areas that are disturbed by the Mine will be progressively rehabilitated following mining activities in accordance with DA 305-7-2003. Revegetation will be progressive, commencing soon after the completion of landform shaping.</i>	Wording of the last paragraph in Section 1.3.2 has been revised to the following: <i>It is proposed to progressively rehabilitate the land to a combination of pasture and woodland as mining of individual areas is completed (i.e. rehabilitation will be progressive and on-going during mining operations).</i>
14. BCD recommends that Figure 2 ‘Wambo Coal Mine General Arrangement’ is revised to make the Wambo Coal Pty Limited land easier to identify.	Noted.	Figure 2 has been updated to make WCPL-owned land more obvious.

Reconciliation of Singleton Council Comments and WCPL Responses/Actions

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
General Comments		
Specifically, further clarity is required on:	-	-
<ul style="list-style-type: none"> - The relationship between the Rehabilitation Strategy required under SSD 7142 and those approved under DA 305-7-2003 MOD 16 and DA 177-8-2004 MOD 3, in particular how the final landforms and final land uses will integrate; 	<p>Final landforms and final land uses are proposed in the documentation required under the relevant approvals for both Projects (i.e. the United Wambo Joint Venture and the Wambo Underground Mine). To allow for final landforms and final land uses to be integrated, WCPL will continue to consult with relevant authorities and stakeholders (e.g. surrounding land owners, United etc.) to refine the final landform/land use concepts.</p> <p>WCPL notes that Singleton Council states: <i>It is good to see that Figure 5 shows an integrated landform with the neighbouring United Wambo Project.</i></p>	No changes to the RMP are proposed.
<ul style="list-style-type: none"> - The relationship between Phase 1, Phase 2 and Phase 3 rehabilitation planning, the rationale for the various phases and the reasoning for limiting the Phase 2 Plan to three (3) years; 	Please see responses made to specific comments below.	Please see responses made to specific comments below.
<ul style="list-style-type: none"> - There is a general lack of clarity around the established (or existing approved) final land use, the rehabilitation outcomes and the post closure land use(s); and 	Please see responses made to specific comments below.	Please see responses made to specific comments below.
<ul style="list-style-type: none"> - The relationship between this Plan and the Mine Exit Strategy required under condition 95. 	The Wambo Coal Mine does not have a requirement to prepare a Mine Exit Strategy under DA 305-7-2003 or DA 177-8-2004. Notwithstanding, when United prepares the Mine Exit Strategy for the United Wambo Open Cut Mine, WCPL will provide input on the Mine Exit Strategy to avoid any misalignment with commitments made in the Wambo Coal Mine RMP.	No changes to the RMP are proposed.

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>The Rehabilitation Plan does not provide detail on how these relationships will be achieved, nor does it establish how, a sustainable final landform and uses that co-exist with surrounding land uses would be achieved.</p> <p>The Plan lacks discussion on the existing surrounding land uses, or the future proposed land uses of surrounding operations and surrounding landowners, and how the final landform proposed in the Plan will accommodate and/or synergise with those uses, including co-existence of uses.</p> <p>Council acknowledges that the final land use domains in the Plan include rehabilitation (pasture and woodland) and mine infrastructure areas. It is important to note that the return of rehabilitation areas to pasture and woodland are not defined land uses under any land use planning definitions. The mine is located on land zoned RU1, which provides for a range of permissible land uses. If rehabilitation activities are signed off, the range of land uses permissible under the RU1 zoning must be supportable through landform design. The Plan does not consider whether the range of permissible post mining land uses are achievable. As such, landform design, stability, safety and sustainability, as documented through this process, should cater for a suite of possible final land uses.</p>	<p>Section 2.2 of the RMP states: <i>... Final land use will comprise of:</i></p> <ul style="list-style-type: none"> • <i>remnant woodland vegetation;</i> • <i>native open woodland vegetation; and</i> • <i>agricultural pastureland.</i> <p>Plan 1B depicts the existing surrounding land uses. Future proposed land uses of the surrounding operations and surrounding landowners are not under the control of WCPL and therefore cannot be presented with any certainty.</p> <p>Section 2.3 of the RMP states: <i>The proposed final landform and final land use are shown in Figures 4 and 5. This is in accordance with the proposed final landform detailed in the Project EIS and the Synoptic Plan for integrated landscape rehabilitation across the Upper Hunter Valley (NSW Department of Mineral Resources, 1999).</i></p> <p><i>Notwithstanding the above, the preferred final landform concepts for the Mine will be revised and refined throughout the life of the Mine, utilising the outcomes of ongoing consultation with relevant authorities, stakeholders and the results of rehabilitation trials.</i></p> <p>As described above, WCPL will continue to consult with relevant authorities and stakeholders (e.g. surrounding land owners, United etc.) to refine the final landform/land use concepts.</p>	<p>No changes to the RMP are proposed.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>Council also acknowledges that the Plan is limited to a time period of 2020 to 2023. It is not clear why this is the case. An explanation in the Plan for the short planning duration, along with a timeline for future planning would be beneficial.</p>	<p>As required by Condition B108, of DA 305-7-2003, the RMP must:</p> <p><i>(l) include detailed scheduling for progressive rehabilitation to be initiated, undertaken and/or completed over the next three years.</i></p> <p>As such, the RMP focuses on the time period of 2020 to 2023 (i.e. the next three years).</p> <p>Notwithstanding the above, the RMP also includes final land use domains and a Final Landform and Rehabilitation Plan (Plan 2). It is worth noting that, as an underground mining operation, the majority of rehabilitation activities will not be able to be undertaken until mine closure as these activities are associated with surface facilities required for the life of mine.</p>	<p>No changes to the RMP are proposed.</p>
<p>Specific Comments</p>		
<p>Section 1.1 identifies that the Phase 2 mining operations include those described in DA 305-7-2003 as states that Phase 2 <i>the phase of the development that comprises underground mining operations at Wambo underground mine, the operation of Wambo infrastructure within the green operational area identified in Figure 2 of Appendix 2 and associated surface development.</i> There is no Figure included in the Plan that shows the relevant elements of Phase 2. There is no description in the Plan of the rationale for phasing the operations of the mine.</p>	<p>The relevant elements of Phase 2 are outlined in Figure 6 and Plan 4.</p> <p>The phases were defined during the assessment process of the United Wambo Joint Venture Project. The phases (in relation to the Wambo Coal Mine) are defined in DA 305-7-2003 as follows:</p> <p><i>Phase 1: The phase of the development that comprises open cut mining operations at Wambo open cut mine, underground mining operations at Wambo underground mine and the operation of Wambo mine infrastructure (including minor upgrades to this infrastructure) within the green operation area identified in Figure 1 of Appendix 2.</i></p> <p><i>Phase 2: The phase of the development that comprises underground mining operations at Wambo underground mine, the operation of Wambo mine infrastructure within the green operational area identified in Figure 2 of Appendix 2 and associated surface development.</i></p> <p><i>Phase 3: The phase of the development following the cessation of underground mining operations that includes mine closure.</i></p>	<p>No changes to the RMP figures are proposed.</p> <p>A summary of the mine phases has been added to Section 1.1.1 of the RMP.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>Section 2.5.1 lists the final land use and mining domains for Phase 2. However, this table appears to include areas that are outside the underground mining operations, and the area depicted in green on Figure 2 of the approval. It is not clear the extent of this overlap, nor how the activities proposed in the Plan will inter-relate with those in SSD 7142.</p>	<p>Table 2 and Figure 4 of the RMP depict some small areas outside of the underground mining operations as a result of exploration activities and development of the North Wambo Creek Diversion.</p> <p>With regards to interaction with activities proposed in SSD 7142, WCPL will be responsible for rehabilitation of any subsidence impacts identified within the “SSD 7142 Operation Area”.</p>	<p>Section 2.5.1 has been updated to state: <i>There are some small areas of Mining Domain 1 (i.e. Mine Infrastructure Areas) that are outside the limits of the underground mining operations and operational area as a result of exploration activities and development of the North Wambo Creek Diversion. These areas have been included for completeness and will be rehabilitated to Final Land Use Domain D (i.e. Rehabilitation [Mixed Pasture/Woodland]).</i></p>
<p>Section 3 defines the overall objective of the final rehabilitated landform to be safe, non-polluting and stable landform that is compatible with the surrounding landscape and meets the requirements of post mining land use. It is good to see that Figure 5 shows an integrated landform with the neighbouring United Wambo Project.</p>	<p>Noted.</p>	<p>-</p>
<p>However, council would like to make the following comments in relation to Table 11 and Table 12 in Section 3:</p>	<p>-</p>	<p>-</p>
<p>- The rehabilitation objectives for Domain 1, 2 4, 8 are the same, despite there being different levels of complexity and potentially variable final land uses;</p>	<p>There is overlap between rehabilitation objectives as these are developed based on final land uses (and a mining domain may have multiple final land uses based on the proposed final landform).</p>	<p>No changes to the RMP are proposed.</p>
<p>- The objectives listed in Table 11 are not replicated in full in Table 12;</p>	<p>Rehabilitation objectives have been split over the various phases of rehabilitation development (i.e. throughout Tables 12 to 16).</p>	<p>No changes to the RMP are proposed.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>- Table 11 and Table 12 include domains that are relevant to the United Wambo Project, it is not clear the extent to which these two operations and the respective plans of management inter-relate.</p>	<p>Tables 12 to 16 outline the stage of rehabilitation at which liability associated with these domains will be exchanged between WCPL and United.</p>	<p>A detailed split of the responsibilities associated with each of the mining titles has been prepared and presented to the NSW Resources Regulator. A cover letter summarising the responsibilities and other commitments has been included in the RMP.</p>
<p>Section 11 identifies ongoing review of the Plan however does not describe how this will take place, the frequency of review, what aspects of the Plan would be reviewed or how adaptive management practices would be identified and implemented should the review identify departure from adopted outcomes.</p>	<p>Under the requirements of the <i>Consultation Code of Practice: Rehabilitation Management Plans for Large Mines</i>, WCPL is required to prepare an Annual Rehabilitation Report and Forward Planning Program (this will likely be a component of WCPL's Annual Review).</p> <p>If the Annual Rehabilitation Report and Forward Planning Program identifies issues associated with rehabilitation, it will provide recommendations to address these issues (e.g. including adaptive management practices if necessary).</p> <p>If the results of the Annual Rehabilitation Report and Forward Planning Program (or in the case of any other circumstances as outlined in Section 11.1 of the RMP) require major amendments to the RMP, WCPL would undertake these amendments in consultation with the appropriate regulatory authorities and stakeholders.</p>	<p>No changes to the RMP are proposed.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>Singleton Council has prepared a Local Strategic Planning Statement (LSPS), as required under the provisions of Part 3 of the Environmental Planning and Assessment Act 1979. This LSPS was exhibited in April/May 2020, and adopted by Council at its July 2020 Council Meeting, and supersedes the Singleton Land Use Strategy. This Plan should be updated to reflect the contemporary strategic land use planning context identified in the LSPS.</p>	<p>WCPL acknowledges that the LSPS identifies the following opportunities for Singleton to grow and innovate of relevance to the Wambo Coal Mine:</p> <ul style="list-style-type: none"> • <i>Delivery of leading practice outcomes for post-mined land, which would involve collaborative pre-planning and investigation.</i> • <i>Protecting, conserving and better utilisation of the natural, historic and cultural landscapes of the LGA in a manner that is sustainable and respectful and does not detract from significance and meaning associated with the landscapes.</i> <p>In consideration of the above, the rehabilitation objectives outlined in Table 11 of the RMP include the following commitments:</p> <ul style="list-style-type: none"> • Mined land will be re-contoured to a landform compatible with the surrounding natural landscape. • 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. • 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>Section 2.4.1 of the RMP has been updated to note these opportunities as outlined in the LSPS.</p>
<p>Table 12 identifies the completion criteria to be adopted for each domain. Under Mine Infrastructure Areas reference is made to the disposal of materials on site, in appropriate coarse reject emplacement areas. Coarse reject emplacements are not identified in the Plan as a specific closure domain with specific management controls. The Plan does not discuss the impact of these emplacements, or their use for disposal of contaminated materials, on various environmental factors, including water quality.</p>	<p>As described in Table 1 of the RMP:</p> <p><i>Coarse rejects and tailings would be incorporated, encapsulated and/or capped within open cut voids (that would comprise part of United’s operations during Phase 2).</i></p> <p>This is an approved element of the operation of both the Wambo Coal Mine and the United Wambo Open Cut Coal Mine.</p>	<p>No changes to the RMP are proposed.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>Section 6.3.2 identifies a number of activities that would be undertaken to decommission mining infrastructure and contaminated materials, including disposal of such in mining voids, tailings emplacements and coarse reject emplacements. Council understands that the operational closure of these facilities would fall under the approved operations of the United Wambo Project. As such, it is not clear the extent to which the rehabilitation planning documents required under SSD 7142 incorporate the closure planning elements needed under DA 305-7-2003.</p>	<p>As noted by Singleton Council, the operational closure of the mining voids, tailing emplacements and coarse reject emplacements falls under the approved operations of the United Wambo Open Cut Coal Mine and, as such, is not discussed in detail in the Wambo Coal Mine Phase 2 RMP.</p>	<p>No changes to the RMP are proposed.</p>
<p>Section 11 discusses how the Plan will be implemented. As described above, under general comments, it is difficult to identify the relationships between existing approved final uses, the final uses proposed at adjacent operations and the final land uses approved for this Project. The section does not provide any information on these linkages, including how these will be created or sustainable.</p>	<p>These linkages are described in other sections of the RMP. Section 11 details the responsibilities for implementation of the RMP and includes a requirement for the Technical Services Manager and Manager: Environment and Community to liaise with relevant stakeholders.</p>	<p>No changes to the RMP are proposed.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>Section 5, Table 25 and Table 26 refer to weather and climatic influences as threats and risks associated with successful rehabilitation. Council acknowledges the identification of flooding, bushfire and drought and real and credible threats to rehabilitation and landform success. It is recommended that the Plan go further to identify long term planning and contingency measures that would be implemented in the event that climate change impacts identified by modelling completed by AdaptNSW are experienced. AdaptNSW climate change modelling can be found at https://climatechange.environment.nsw.gov.au/.</p>	<p>WCPL has reviewed the AdaptNSW climate change modelling (and in particular, the snapshot provided for the Hunter region) and acknowledges that, of relevance to the Wambo Coal Mine, in the near future (2020 – 2039):</p> <ul style="list-style-type: none"> • Maximum temperatures are projected to increase by 0.4 – 1.0°C. • Minimum temperatures are projected to increase by 0.5 – 0.9°C. • Rainfall is projected to decrease in spring and winter. • Average fire weather risk is projected to increase in summer, spring and winter. <p>WCPL notes that the key risks to rehabilitation associated with the above changes is the increase in fire weather risk. WCPL has an existing Bushfire Management Plan that was prepared in consultation with the Rural Fire Service and Singleton Council to manage this risk throughout the life of the mine.</p>	<p>Section 5 of the RMP has been updated to include text outlining the potential risks to rehabilitation associated with climate change (as predicted by the AdaptNSW climate change modelling).</p>
<p>The Plan does not include any discussion on how the Rehabilitation Objective to minimise adverse socio-economic effects associated with mine closure would be achieved under the current, or future, Plan.</p>	<p>This will be addressed in future RMPs.</p>	<p>Section 3.1 of the RMP has been updated to state:</p> <p><i>As operations approach completion at the Mine (i.e. within five years of closure), this RMP will be updated to provide further detail on measures to be taken to minimise the potential adverse socio-economic effects associated with mine closure.</i></p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>The Plan does not include how the progressive landform design would support any future land uses. Further clarification is required regarding the relationship between rehabilitation and mine closure, the timing of both, how the rehabilitated landform will achieve the approved final land uses and, given the life proposed for this Plan, the details that would be provided in subsequent Rehabilitation Management Plans.</p>	<p>It is worth noting that, as an underground mining operation, the majority of rehabilitation activities will not be able to be undertaken until mine closure as these activities are associated with surface facilities required for the life of mine.</p> <p>Notwithstanding the above, Section 6.1 of the RMP states:</p> <p><i>Areas that are disturbed by the Mine will be progressively rehabilitated following mining activities in accordance with DA 305-7-2003. Revegetation will be progressive, commencing soon after the completion of landform shaping.</i></p>	<p>No changes to the RMP are proposed.</p>
<p>Additionally, further clarification is required on the adaptive management strategies that will be implemented if, during operations and/or review of the Plan, the Rehabilitation Objectives in Table 10 of the approval are not being met.</p>	<p>Under the requirements of the <i>Consultation Code of Practice: Rehabilitation Management Plans for Large Mines</i>, WCPL is required to prepare an Annual Rehabilitation Report and Forward Planning Program (this will likely be a component of WCPL's Annual Review).</p> <p>If the Annual Rehabilitation Report and Forward Planning Program identifies issues associated with rehabilitation, it will provide recommendations to address these issues (e.g. including adaptive management practices if necessary).</p>	<p>No changes to the RMP are proposed.</p>
<p>The Plan does not include the following, as required by the conditions of consent:</p>	<p>-</p>	<p>-</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>- A description of how the rehabilitation of the site would be integrated with rehabilitation of the Wambo train loading facility and SSD 7142 United Wambo open cut coal mine;</p>	<p>SSD 7142 does not require this to be completed until five years prior to closure of the United Wambo Open Cut Project. Notwithstanding, WCPL has considered the rehabilitation of the United Wambo Open Cut Coal Mine and has integrated these activities throughout the RMP.</p> <p>With regards to integration of rehabilitation with the Wambo train loading facility, this is included in Section 6.3.2 of the RMP.</p> <p>The RMP also commits to continuing to consult with relevant authorities and stakeholders (e.g. surrounding land owners, United etc.) to refine the final landform/land use concepts and ensure an integrated final landform.</p>	<p>Section 6.3.2 of the RMP has been updated to more clearly describe how the rehabilitation of the site would be integrated with rehabilitation of the Wambo train loading facility:</p> <p>Train Loading Facility</p> <p><i>Subject to consultation with relevant stakeholders at the time of decommissioning (e.g. DPIE), rehabilitation of the train loading facility would be integrated and undertaken in concert with rehabilitation of the key Mine Infrastructure Areas that are required for the life of the mine (e.g. CHPP). 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.</i></p>
<p>- Detailed tailings management strategy that includes:</p> <p>(iii) a strategy for treating and/or emplacing all tailings material generated by the Wambo CHPP; and</p> <p>(iv) (ii) timing for rehabilitation of all tailings storage facilities, in order that final landform and land use objectives can be achieved in a timely manner;</p>	<p>Emplacement of tailings material generated by the Wambo CHPP is described in Section 6.3.1 of the RMP. The timing for the capping (i.e. commencement of rehabilitation) of each of the tailings facilities that will cease active tailings disposal during the RMP Term is also provided.</p>	<p>No changes to the RMP are proposed.</p>

Comment	Response	Change Made to Wambo Coal Mine Phase 2 – Rehabilitation Management Plan December 2020 – December 2023
<p>- Detailed scheduling for progressive rehabilitation to be initiated, undertaken and/or completed over the next three years.</p>	<p>Section 6.1 of the RMP details the areas to be rehabilitated over the next three years and states:</p> <p><i>Areas that are disturbed by the Mine will be progressively rehabilitated following mining activities in accordance with DA 305-7-2003. Revegetation will be progressive, commencing soon after the completion of landform shaping.</i></p> <p>WCPL notes that, as an underground mining operation, the majority of rehabilitation activities will not be able to be undertaken until mine closure as these activities are associated with surface facilities required for the life of mine.</p> <p>As such, a detailed schedule of rehabilitation timing is considered to be unnecessary.</p>	<p>No changes to the RMP are proposed.</p>
<p>Council recommends that the Plan be updated to include a detailed schedule of rehabilitation timing.</p>	<p>WCPL notes that, as an underground mining operation, the majority of rehabilitation activities will not be able to be undertaken until mine closure as these activities are associated with surface facilities required for the life of mine.</p> <p>As such, a detailed schedule of rehabilitation timing is considered to be unnecessary.</p>	<p>No changes to the RMP are proposed.</p>