WHITEHAVEN COAL

WERRIS CREEK
REHABILITATION MANAGEMENT PLAN

Approval	Name	Position	Signed	Date
Document Owner:	Andrew Raal	Superintendent Closed Mines		
Authorised by:	Murray O'Keefe	Operations Manager		29/7/2022

Summary Table	
Name of Mine	Werris Creek Coal Mine
Rehabilitation Management Plan Commencement Date	August 2022
Mining Authorisations (Lease / Licence No.)	Mining Lease (ML) 1563 Expiry 23 March 2026 Mining Lease (ML) 1671 Expiry 09 March 2033 Mining Lease (ML) 1672 Expiry 09 March 2033
Name of Authorisation holder(s)	ML 1563: Creek Resources Pty Ltd and Betalpha Pty Ltd ML1671 / ML 1672: Werris Creek Coal Pty Limited
Name of Mine Operator (if different)	Werris Creek Coal Pty Limited
Date	August 2022
Version	Final

Contents

1 INTRODUCTION TO MINING PROJECT

Werris Creek Coal Mine (WCCM) is an open cut mine owned and operated by Werris Creek Coal Pty Limited (WCC), a wholly owned subsidiary of Whitehaven Coal Limited (WHC). WCC comprises Mining Leases (ML) 1563, 1671 and 1672, approximately 1.5km South of Werris Creek and 11km North-Northwest of Quirindi in the Northwest slopes and plains region of New South Wales, within an area defined as Gunnedah Coalfield (**Figure 1**).

This Rehabilitation Management Plan (RMP, the Plan) has been prepared in accordance with the Mining Exploration and Geoscience – Resources Regulator's (RR) *Form and Way: Rehabilitation Management Plan for Large Mines* (RR, 2021) and associated guidelines (refer **Section 1.3**). The Plan has also been prepared to satisfy Condition 43, Schedule 3 of PA 10_0059 which requires WCCM to prepare and implement a Rehabilitation Management Plan in accordance with the conditions imposed on mining leases associated with the mine under the *Mining Act 1992*.

1.1 HISTORY OF OPERATIONS

Historic Consents

Underground mining at the former Werris Creek Colliery commenced commercially in 1925, closing in 1963 due to the cancellation of railway contracts for coal. The operation owned by Preston Coal Company was small, employing a total of 13 people in 1928. The Former Colliery was predominantly a bord and pillar underground operation mined the lower 2.5m of what was referred to as the "Tunnel Seam" which corresponds to the E Seam of the Mine.

In 2002, Exploration license (EL) 5993 was granted to Creek Resources Pty Ltd and Betalpha Pty Ltd to undertake further exploration of the coal basin. Development Consent DA 172-7-2004 was approved on the 18 February 2005 and ML 1563 was granted on 23 March 2005. Construction for open cut operations commenced in April 2005. Development Consent DA 172-7-2004 was modified in 2008 to allow mining of the former Werris Creek underground workings, an increase in height and lateral extension to the overburden emplacement for the period 1 October 2009 to 31 December 2011.

Current Consent

In 2011 WCCM received Project Approval PA 10_0059 from the Deputy Director-General (as delegate of the Minister for Planning and Infrastructure) under Part 3A of the EP&A Act for the Werris Creek Mine Extension Project. PA 10_0059 provides for an open cut mining sequence as a series of East-West oriented benches, with access to the lower sections of the open cut obtained by haul ramps developed on the low wall of the open cut (where overburden is progressively placed within the mined-out sections of the open cut).

PA 10_0059 has been modified on four (4) occasions. WCCM is approved under PA 10_0059 to carry out mining operations at a maximum rate of 2.5 million tonnes per annum (Mtpa) using open cut methods until December 2032. A Project Layout is shown in **Figure 2.**

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WERRIS CREEK

FIGURE 1
REGIONAL LOCALITY

LEGEND

Project Approval Boundary

Approval Boundary

Data Sources:
DoR NSW Exploration and Mining Leases
NSW LPI Base Map

0 1 2 Kilometres

Coordinate System:	GDA2020
Scale:	1:50,000 at A3
Project Number:	630.30268
Date:	25-Jul-2022
Drawn by:	LC
Annual Reporting Period:	2021

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WERRIS CREEK

FIGURE 2
SITE LAYOUT

LEGEND

- Project Approval Boundary
- Railway

Data Sources:
DoR NSW Exploration and Mining Leases
NSW LPI Base Map

0 250 500 Metres

Coordinate System:	GDA2020
Scale:	1:19,503 at A3
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1.2 CURRENT DEVELOPMENT CONSENTS, LEASES AND LICENCES

1.2.1 DEVELOPMENT CONSENTS

Table 1 below shows the Development Consent held by WCCM.

Table 1 Development Consents

Issuing / Responsible Authority	Development Consent	Details	Date of Issue
DPE	PA 10_0059	Issued under the now repealed Part 3A of the EP&A Act.	25/10/2011
	PA 10_0059 MOD1	Approving minor extensions to the overburden emplacement, dry screening operations and off-site use of void water for agricultural activities.	30/08/2012
	PA 10_0059 MOD2	Approving minor extensions to the overburden emplacement, dry screening operations and off-site use of void water for agricultural activities.	03/11/2015
	PA 10_0059 MOD3	Modification to update **Appendix 2** of PA 10_0059 to correctly reflect the changes approved for MOD2	06/03/2020
	PA 10_0059 MOD4	Approving onsite disposal of end-of-life heavy plant tyres	16/04/2021

1.2.2 EPBC APPROVALS

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) requires consideration of the potential for a "significant impact" to be imposed by an activity on a 'matter of national environmental significance'. In the event that such an impact is likely to be imposed, the activity must be referred to the Commonwealth for determination as to whether it constitutes a "controlled action". Where a development activity does constitute a controlled action, approval from the Australian Government Minister for the Environment is required.

EPBC Act approval EPBC 2010/5571 was granted on the 21 December 2011 by the former Australian Department of Agriculture, Water and the Environment. EPBC 2010/5571 was granted with no conditions related to rehabilitation and expires on 31 December 2032.

1.2.3 AUTHORISATIONS

WCCM currently holds ML 1563, ML 1671 and ML 1672. These authorisations are outlined in **Table *2***.

Table 2 Authorisations

Issuing / Responsible Authority	Licence	Grant Date	Expiry Date	Status
RR	Mining Lease (ML) 1563	23/02/2005	23/03/2026	Current
RR	Mining Lease (ML) 1671	09/03/2012	09/03/2033	Current
RR	Mining Lease (ML) 1672	09/03/2012	09/03/2033	Current

1.2.4 OTHER APPROVALS

A summary of all licences held by WCCM for the mining operations are included in **Table 3.**

Table 3 Licences

Issuing / Responsible Authority	Licence	Licence Type	Grant Date	Expiry date
EPA	EPL 12290	Environment Protection Licence	18/04/2005	Anniversary date: 01 April Review Date: 23 June 2019
Department of Primary Industries – Water (DPI Water)	WAL29506	Monitoring bores	21/02/201	Continuing tenure
	WAL32224		19/06/2013	Continuing tenure
	90WA822532		15/01/2010	15/01/2025
	90WA828345		15/06/2012	15/06/2017
Dam Safety Committee	Werris VWD1		18/10/2012	Perpetuity
	Werris VWD3		13/12/2012	Perpetuity
	Werris VWD2		13/12/2012	Perpetuity
Liverpool Plains Shire Council	Sewerage Management Systems 04/06		01/03/2006	Perpetuity
	Sewerage Management Systems 05/06		01/03/2006	Perpetuity

1.3 APPLICABLE GUIDELINES

In addition to the regulatory requirements identified above, this Plan has been prepared with consideration for the following guidelines, standards and policies:

- *Form and way: Rehabilitation Management Plan (large mines);*
- *Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines;*
- *Guideline: Rehabilitation risk assessment;*
- *Guideline: Rehabilitation objectives and rehabilitation completion criteria;*
- *Planning for Integrated Mine Closure Toolkit (ICMM, 2008);*
- *Mining Amendment (Standard Condition of Mining Leases – Rehabilitation) Regulation 2021;*
- *Strategic Framework for Mine Closure (ANZMEC 2000);*
- *Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure and Completion, Mine Rehabilitation (Commonwealth Department of Industry, Tourism and Resources);*
- *Best Practice Environmental Management in the Mining Industry Series;*
- *Enduring Value (Mineral Council of Australia 2015);*
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007 (Mining SEPP).*

1.4 LAND OWNERSHIP AND LAND USE

1.4.1 HISTORIC AND CURRENT LAND USE

Land Ownership within and surrounding Werris Creek is shown on **Figure 3, Figure 4 and Figure 5.** As evident, all freehold land within ML 1563, ML 1761 and ML 1762 is owned by Whitehaven.

The schedule of Lands attached to PA10_0059 is reproduced in **Appendix A** details land ownership and property descriptions within and surrounding Werris Creek.

1.4.2 HISTORIC AND CURRENT LAND USE

The WCCM is located within the Werris Creek and Quipolly locality area, an area dominated by small scale mixed farming. The intensity of agricultural farming increases heading west on the Liverpool plains. The surrounding land uses include mining and extractives (Zeolite and gravel), traditional agriculture (cropping and grazing), biodiversity offsets, as well as the former Werris Creek Colliery, remnants of which have been identified on the “Preston Park” property.

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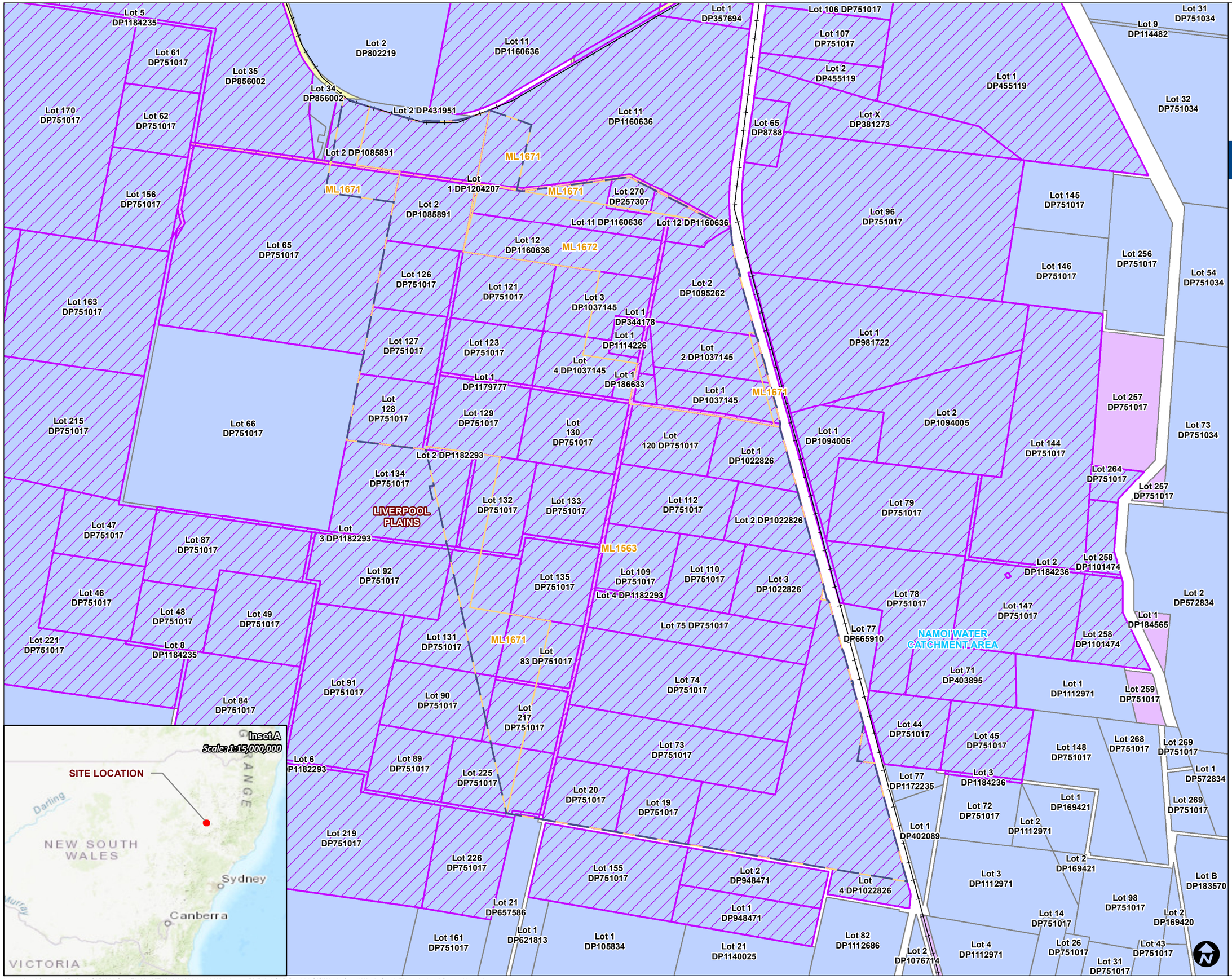
WERRIS CREEK

FIGURE 3
LAND OWNERSHIP



LEGEND

- Railway
- Project Approval Boundary
- Mining Lease
- Local Government Area
- Property Boundaries
- Whitehaven Owned Land

Land Ownership

- Crown
- Freehold
- Local Government Authority
- NSW Government

Data Sources:
NSW Spatial Information Exchange
DoR NSW Exploration and Mining Leases
NSW LPI Land Status Cadastre & Ownership

0 250 500 m

Coordinate System:	GDA2020
Scale:	1:22,000 at A3
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WERRIS CREEK

FIGURE 4
LAND USE AND CONTOURS

LEGEND

- Railway
- Current Landform Contour (5 mAHD)
- Project Approval Boundary
- Mining Lease
- Local Government
- Property Boundaries

Land Use

- 1.3.0 Other minimal use
- 2.1.0 Grazing native vegetation
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 3.4.0 Perennial horticulture
- 5.4.0 Residential and farm infrastructure
- 5.7.0 Transport and communication
- 5.8.0 Mining
- 6.2.0 Reservoir/dam

Data Sources:
NSW Spatial Information Exchange
DoR NSW Exploration and Mining Leases
ESRI Basemap world imagery 2022
NSW LPI Land Status Cadastre & Ownership
NSW DPE Landuse 2017

0 250 500 m

Coordinate System:	GDA2020
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WERRIS CREEK

FIGURE 5
VEGETATION COMMUNITIES

ML1671
ML1671
ML1671
ML1672
ML1671
ML1563
ML1671
LIVERPOOL PLAINS
NAMOI WATER CATCHMENT AREA

LEGEND

- Railway
- Project Approval Boundary
- Mining Lease
- Local Government
- Property Boundaries

Plant Community Type

- No Data
- 0 - Non-Native
- 1 - Candidate Native Grasslands
- 433 - White Box grassy woodland to open woodland on basalt flats and rises in the Liverpool Plains sub-region, BBS Bioregion
- 591 - White Box shrubby open forest on hills mainly in the Nandewar Bioregion

Data Sources:
NSW Spatial Information Exchange
DoR NSW Exploration and Mining Leases
NSW LPI Land Status Cadastre & Ownership
NSW Seed OEH Board Rivers Gwydir/Namoi regional native vegetation map v2 2015

0 250 500 m

Coordinate System:	GDA2020
Scale:	1:22,000 at A3
Project Number:	630.30268
Date:	26-Jul-2022
Drawn by:	JG
Annual Reporting Period:	2021

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\\au.slr.local\Corporate\Projects-SLR\630-SrvNTL\630-NTL\630.30268.00000 Whitehaven RMPs\06 SLR Data\01 GIS\Werris Creek\Werris Creek Figure 5 - Vegetation Communities.mxd

1.4.3 FUTURE LAND USE

The future land use nominated for the WCCM is an integrated landscape that is safe, stable, non-polluting and sympathetic to surrounding landforms. Revegetation will provide for a combination of sustainable grazing, woodland vegetation and habitat corridors.

Detailed mine closure planning will identify infrastructure that is to be decommissioned and removed as well as infrastructure that will be retained to support the final land use (such as dams).

The post mining land use has been determined through consultation and agreement with landowners and relevant stakeholders. Ongoing consultation with stakeholders is detailed in **Section 4.4**

2 FINAL LAND USE

2.1 REGULATORY REQUIREMENTS FOR REHABILITATION

The regulatory requirements specific to post mining land use, rehabilitation and closure at WCC are summarised in **Table 4.**

Table 4 Regulatory Requirements Rehabilitation

Condition	Requirement	Domain	Timing	Section Addressed
Mining Lease (ML) 1563, Mining Lease (ML) 1671, Mining Lease (ML) 1672				
Part 2 Standard Conditions Division 1 Condition 4	Prevent or minimise harm to the environment.	All	Ongoing	Section 3
Part 2 Standard Conditions Division 1 Condition 5	Rehabilitate land and water as soon as reasonably practicable after disturbance occurs.	All	Ongoing	Section 6.1
Part 2 Standard Conditions Division 1 Condition 6	Achieve the approved final land use for the mining area as set out in the: • rehabilitation objectives statement; • rehabilitation completion criteria statement; and • final landform and rehabilitation spatial plan (large mines only).	All	Prior to relinquishment	Section 2.3
Part 2 Standard Conditions Division 2 Condition 7	Undertake a rehabilitation risk assessment and implement measures to eliminate, minimise or mitigate risks to achieving the final land use.	All	Complete/ Ongoing	Section 3
Part 2 Standard Conditions Division 3 Condition 10	Prepare and implement a rehabilitation management plan (large mines only).	All	Complete	This document
Part 2 Standard Conditions Division 3 Condition 13	Prepare an annual rehabilitation report which describes the progress of rehabilitation over the annual reporting period.	All	Ongoing	Section 6

Condition	Requirement	Domain	Timing	Section Addressed
Part 2 Standard Conditions Division 3 Condition 13	Prepare a forward program which includes the schedule of mining and rehabilitation activities for the next three years demonstrating how rehabilitation will occur as soon as reasonably practicable after disturbance.	All	Ongoing	Section 6
Project Approval PA 10_0059				
Schedule 3, Condition 41	**Rehabilitation Objectives** The Proponent shall rehabilitate the site to the satisfaction of the Executive Director, Mineral Resources in DRE. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA and comply with the objectives in **Table 13**. **Table 13: Rehabilitation objectives** **Feature** / **Objective** Mine Site (as a whole) / Safe, stable & non-polluting; • Constructed landforms sympathetic to natural landforms (including landform micro-relief) as far as practical; • Final land uses compatible with surrounding land uses; and Minimise visual impact of final landforms as far as reasonable and feasible.	All Domains	Prior to closure	Sections 4 to 7

Condition	Requirement	Domain	Timing	Section Addressed
	Woodland areas andother vegetated land: Establishment of at least 280 hectares of White Box-Yellow Box-Blakely's Red Gum Woodland EEC; and Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems that is comprised of: • local native plant species; • at least 180 hectares of shrubby woodland. Amenity Bunds and Overburden Emplacements: Early revegetation and planting with local native woodland species; and Free draining. Final Void: Minimise the size and depth of the final void as far as is reasonable and feasible, with its floor a minimum of 5 metres above the predicted long-term groundwater level. Project infrastructure: To be decommissioned and removed, unless the Executive Director,DRE agrees otherwise. Community: Minimise the adverse socio-economic effects associated with mineclosure.			
Schedule 3, Condition 42	**Progressive Rehabilitation** The Proponent shall carry out rehabilitation of the Mine Site progressively, that is, as soon as reasonably practicable after disturbance.	All Domains	Ongoing	Sections 5 to 7
Schedule 3, Condition 43	Rehabilitation Management Plan The Proponent shall prepare and implement a Rehabilitation Management Plan for the project to the satisfaction of the Executive Director, Mineral Resources in DRE. This plan must:	All Domains	Ongoing	This Document

Condition	Requirement	Domain	Timing	Section Addressed
	a) be prepared in consultation with the Department, DPI Water, OEH, Council and the CCC;			Sections 4 to 5
	b) be submitted to the Executive Director, Mineral Resources in DRE by the end of April 2012;		Completed	N/A
	c) be prepared in accordance with any relevant DRE guideline;		Ongoing	Section 1.2 and 1.3
	d) describe how the rehabilitation of the site would be integrated with the implementation of thebiodiversity offset strategy;			Section 4.3, Table 4.2 and Section 7.2.9
	e) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and triggering remedial action (if necessary);			Section 4.3, 10 and Table 24
	f) describe the measures that would be implemented to ensure compliance with the conditionsof this approval; and address all aspect of rehabilitation including, mine closure final landform final land use			Sections 5 to 7 Sections 6, 5.1, 2 & 5
	g) include a program to monitor and report on the effectiveness of the measures, and progressagainst the detailed performance and completion criteria; and			Section 8
	h) build to the maximum extent practicable on the other management plans required under thisapproval.			Section 1.3
Schedule 3, Condition 28	Integrate the Biodiversity Offset Strategy with the overall rehabilitation of the site.	All Domains	Ongoing	Section 4.3, 6.3.1 and 6.3.5 and Table 12
Schedule 3, Condition 26	Ensure the biodiversity offset strategy and/or rehabilitation strategy is focused on the re- establishment and/or enhancement of: the following endangered ecological communities:		Ongoing	Sections 4.3, 6 to 8(and

Condition	Requirement	Domain	Timing	Section Addressed
	• White Box-Yellow Box-Blakely's Red Gum Woodland EEC; and • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC; and habitat for threatened fauna species, including the: • Regent Honey Eater, Swift Parrot, Brown Treecreeper, Hooded Robin, Little Lorikeet, and Barking Owl; and • Eastern Bent-wing Bat, Eastern False pipistrelle, Yellow-bellied Bent-wing Bat andGreater Broad-nosed Bat.			Tables 12
Schedule 3, Condition 37	Progressively rehabilitate overburden emplacement areas including partial rehabilitation oftemporarily inactive areas and proposed topsoil storage Stockpiles.	Overburden Emplacement Area	Ongoing	Section 6
Schedule 5, Condition 2	The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	All Domains	Ongoing	Section 1.3
	a) detailed baseline data;			Section 8
	b) a description of: the relevant statutory requirements (including any relevant approval, licence or leaseconditions); any relevant limits or performance measures/criteria; the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any managementmeasures;			Section 2 (Table 4) Section 4.3 (Table 12)
	c) a description of the measures that would be implemented to comply with the relevantstatutory requirements, limits, or performance measures/criteria;			Sections 6 to 9
	d) a program to monitor and report on the: impacts and environmental performance of the project; effectiveness of any management measures (see (c) above);			Section 8

Condition	Requirement	Domain	Timing	Section Addressed
	e) a contingency plan to manage any unpredicted impacts and their consequences;			Section 9 and 10 (Table 24)
	f) a protocol for managing and reporting an incidents; complaints non-compliances with statutory requirements; and exceedances of the impact assessment criteria and/or performance criteria; and			N/A
	g) a protocol for periodic review of the plan.			Section 11
Environmental Assessment (RWC, 2015)				
Environmental Assessment (RWC, 2015)	Provide a vegetated wildlife corridor across the Proponent's land holdings and the Quipolly Creek Catchment linking with sub-regional habitat corridors. Reduce the visibility of mine-related activities from adjacent properties, Werris Creek and the local road network. Construct a landform sympathetic to the surrounding topography. Provide a low maintenance, geotechnically stable and safe landform with minimal erosion.	All Domains	Prior to closure	Sections 4.3, 5 and 6 Table 12 Section 6.3.4
Environmental Assessment (RWC, 2015) (Cont'd)	Achieve a soil profile capable of sustaining the specified final land use. Establish native vegetation with the species diversity commensurate to each relevant vegetation community.	Agricultural – grazing and Native Ecosystem	Growth Medium Development	Section 6
	Re-instate areas of Rural Land Capability Class III commensurate with the agricultural land use on and around the Mine. Re-instate woodland vegetation communities commensurate with the remnant woodland vegetation disturbed by mining and associated activities.	Agricultural – grazing and Native Ecosystem	Prior to closure	

Condition	Requirement	Domain	Timing	Section Addressed
	Undertake habitat augmentation to improve and promote corridors for fauna movement linking adjacent remnant woodland vegetation with the rehabilitation of the Mine.			
	Decommissioning of structures and facilities in accordance with the EA or as agreed as part of a Closure MOP.	All Domains	Decommissioning	Sections 6.3.2, Table 12
	The final landform and land use will be in accordance with Sections 2.10.3 and 2.10.4, referencingFigure 2.6 of the EA (unless modified by this MOP).	Agricultural – grazing and Native Ecosystem	Prior to closure	Section 4,
	The final landform is to be revegetated in accordance with Section 2.10.6.4 of the EA (unlessmodified by this MOP).	Agricultural – grazing and Native Ecosystem	Prior to closure	Section 6.3.4-6.3.6

2.2 FINAL LAND USE OPTIONS ASSESSMENT

This section is not applicable to the WCCM RMP as the final land use is specified under Project Approval PA 10_0059 (refer to **Section 2.1**).

2.3 FINAL LAND USE STATEMENT

The nominated post mining land use goals for Werris Creek Mine are as follows:

To re-establish the following woodland vegetation communities:

Box Gum Woodland and Derived Native Grassland (EEC equivalent).

Brigalow-Belah Woodland (EEC equivalent).

Shrubby White Box Woodland.

To reinstate areas of the Mine amenable to Class III capable agricultural land.

To ensure rehabilitation and revegetation is self-sustaining and follows the principles of sustainable development.

The rehabilitation of the Mine forms part of a broader strategy to improve biodiversity outcomes of the of the local setting. This will be achieved through integration of the rehabilitated Mine landforms and vegetation types with the conservation of remnant native vegetation which is in good condition, along with improvement and conservation of degraded native vegetation, e.g., land previously managed for agriculture. The vegetation conservation and improvement activities are being undertaken in accordance with a Biodiversity Offset Strategy (BOS) which encompasses a Biodiversity Offset Area (BOA) of approximately 1,319ha on lands on and surrounding the Mine.

A broader and post mining land use goal for Mine rehabilitation, integrated with the land use goal of the BOS, is to integrate the rehabilitated landform of the Mine with the BOA in order to maximise the wildlife corridor between remnant native vegetation of the hill to the east and west of the Mine.

2.4 FINAL LAND USE AND MINING DOMAINS

2.4.1 FINAL LAND USE DOMAINS

Final land use domains are defined as land management units characterised by similar final land use objectives. Each final land use domain will require specific rehabilitation methods.

The final land use domains for this Plan are presented in **Table 5** and shown on the Final Landform and Rehabilitation Plan (refer to **Figure 6)**.

Table 5 Final Land Use Domains

Code	Final Land Use Domain	Description
A	Native Ecosystem	This domain includes those areas of the Mine (Including final void) that will be rehabilitated to vegetation community consistent with either: Box Gum Woodland and Derived Native Grassland (EEC equivalent); Brigalow-Belah Woodland (EEC equivalent); or Shrubby White Box Woodland.

Code	Final Land Use Domain	Description
B	Agricultural - grazing	Utilising the Land and Soil Capability (LSC) system for NSW, this domain includes those areas of the Mine that will be rehabilitated in a manner suitable for agricultural purposes to achieve an agricultural capability equivalent to Class 3. This domain is predominantly associated with the Product Coal Storage Area, Rail Load-out Facility and Rail Loop.
F	Water Management Area	This domain includes those water management structures that will remain in place following mine closure, including: clean water diversion drains around the overburden emplacement (as these areas are expected to be well vegetated and form part of functioning and sustainable hydrological setting of the final overburden landform and areas immediately downslope)
G	Water Storage	This domain includes those water storage structures that will remain in place following mine closure, including: sediment basins down-slope of previous areas of disturbance (to act as watering points for livestock or habitat features for native fauna); and clean water dams located to the south of the Site Access Road.
I	Infrastructure	This domain includes those items of infrastructure that will remain following mine closure for a lawful land use, namely a land use permitted without consent or following granting of development consent. In the absence of further approvals, this would indicatively include: Escott Road; Site Access Road; and the “Eurunderee” homestead.

2.4.2 MINING DOMAINS

Mining domains identify the footprint of areas disturbed for mining related activities. For the purpose of this Plan, mining domains have been defined as the set of discrete areas that have a particular operational or functional purpose, therefore having similar geophysical and geochemical characteristics that will have similar rehabilitation requirements.

Mining domains are presented in **Table 6.**

Table 6 Mining Domains

Code	Mining Domain	Description
1	Infrastructure Area	This domain includes: ▪ the Mine Infrastructure Area, including: the ROM Pad; Fixed crushing plant and screens; Dry separation plant; Workshops; Offices and ablution facilities; Car park; and Various road. the Rail Load-out Facility and Rail Loop; the Product Coal Storage Area;

		the Explosives Magazine; the Precursor Storage Facility; the "Eurunderee" homestead (which provides additional laydown area); and Mine roads (excluding haul roads); Former soil stockpiles.
3	Water Management Area	This domain includes all void, clean and dirty water dams, diversion drains and associated infrastructure.
4	Overburden Emplacement Areas	This domain will include the overburden emplacement area, both in-pit and out-of-pit components, in its entirety. The extent of this domain will vary over the term of the MOP as the emplacement progressively in-fills the void (Domain 6) towards maximum extent. Other areas of the Mine included as Domain 4 include: the Acoustic and Visual Amenity Bund; and the Mine Infrastructure Area (MIA) Bund.
5	Active Mining Area (Open Cut Void)	This domain refers to the active area of mining beyond the toe of the in-pit component of the overburden emplacement. There is potential overlap between domain 6 and Domain 4 given the overburden emplacement is constructed by backfilling the open cut void.

3 REHABILITATION RISK ASSESSMENT

3.1 SUMMARY OF RISK ASSESSMENTS

Multiple risk assessments have been completed historically for the rehabilitation works associated with WCC. Based on review of historic documentation, **Table 7** summarises the identified risk assessments.

Table 7 Summary of Risk Assessments

Date	Risk Assessment	Details
June 2015	MOP Risk Assessment	A risk assessment was undertaken during the preparation of the MOP to address risks to rehabilitation and closure at WCCM.
2020	Gunnedah Open Cut Qualitative Risk Assessment	Determine the environmental aspects of the Gunnedah Open Cut Operations, rehabilitation and closure activities, products and services that it can control and those that it can influence and their associated environmental impacts.
2021	Gunnedah Open Cut Broad Brush Risk Assessment (BBRA)	BBRA review to review material risks and controls.
2021	Gunnedah Open Cut Bowtie Risk Assessment	Bowtie reviewed material risks and controls.
2022	RMP Risk Assessment	Rehabilitation Risk Assessment is required to be undertaken as part of the Rehabilitation Reform process underway to develop a Rehabilitation Management Plan for WCCM, Moderated by SLR 20/01/22.

3.2 REHABILITATION RISK ASSESSMENT

Conditions of a mining lease granted under the Mining Act 1992 require the lease holder to conduct a rehabilitation risk assessment and implement measures to eliminate, minimise or mitigate the risks in accordance with the Resources Regulator's Guideline: Rehabilitation risk assessment.

A risk assessment workshop was undertaken on 20 January 2022. The workshop was used to identify the key issues that presented a risk to achieving satisfactory rehabilitation at WCCM.

The risk assessment included key Whitehaven and SLR personnel and was undertaken in accordance with AS/NZS ISO 31000:2018 Risk Management – Guidelines, the Risk Management Handbook for the Mining Industry (MDG1010). Whitehaven's Risk Matrix was used to calculate the consequence and likelihood of an event and to evaluate the subsequent risk level (risk rank).

The risk assessment has been used to inform the preparation of this Plan. The objectives of the risk assessment were to:

- Identify the risks associated with rehabilitation and closure of WCCM to achieve the approved post mining land uses;

- Identify knowledge gaps in Whitehaven's current understanding of the risks to rehabilitation;
- Inform the development of this RMP, to provide a basis to determine additional investigations and/or project works to be undertaken; and
- Provide the framework to satisfy relevant internal and government guidelines, requiring implementation of a risk-based approach to closure.

The risk workshop assessed a total of 57 key rehabilitation risks, which are summarised as:

- 13 risks were ranked as not applicable;
- 23 risks were ranked as low;
- 20 risks were ranked as moderate;
- 1 risk was ranked as high; and
- 0 risks were ranked as critical.

Rehabilitation risks, controls and proposed controls will regularly be reviewed and revised (as required)

3.2.1 SPECIFIC RISKS RELATING TO REHABILITATION

The key risks (including high and critical risks) to successful rehabilitation and associated risk controls identified within the January 2022 workshop have been summarised in **Table 8.** The outcomes of the risk assessment workshop have been used to inform the preparation of this Plan.

Table 8 Key Rehabilitation Risks and Identified Controls

Risk Rating	Key Risk	Key Controls	Sections Addressed
High	Availability of areas for revegetation in optimal seasonal conditions.	Short term planning process (STP)	Section 7
		Annual Rehabilitation Plan.	Section 8.2.3 and 11.2
		Rehabilitation integrated into the planning process	Section 7
		Specialist rehabilitation contractors	Section 7

3.2.2 FURTHER STUIDES/ACTION PLAN

A number of proposed controls and further studies were identified during the risk assessment workshop. **Table 9** presents an action plan for implementation of the additional risk controls (including high and critical risks).

Table 9 Further Studies / Action Plan

Risk Rating	Risk	Proposed Control / Study	Timeframe
High	Availability of areas for revegetation in optimal seasonal conditions.	Link LOM Planning and integrated with STP	Complete

4 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

4.1 PA10_0059 REQUIREMENTS

In accordance with Schedule 3 Conditions 41 to 43 of PA 10_0059 (as modified) WCCM will:

- Rehabilitate the site to the satisfaction of the Resources Regulator;
- Rehabilitate the site to a final landform generally consistent with that approved and presented in the EA;
- rehabilitate all parts of the site to comply with the rehabilitation objectives in **Table 10;** and
- rehabilitate the site progressively, as soon as reasonably practicable after disturbance.

Table 10 Rehabilitation Objectives

Feature	Objective
Mine site (as a whole)	Safe, stable and non-polluting; Constructed landforms sympathetic to natural landforms (including landform micro-relief) as far as practical; Final land uses compatible with surrounding land uses; and Minimise visual impact of final landforms as far as reasonable and feasible.
Woodland areas and other vegetated land	Establishment of at least 280 hectares of White Box-Yellow Box-Blakely's Red Gum Woodland EEC; and Restore Ecosystem function, including maintaining or establishing self-sustaining ecosystems that is comprised of: - local native plant species; - at least 180 hectares of shrubby woodland.
Amenity Bunds and Overburden Emplacements	▪ Early revegetation and planting with local native woodland species; and ▪ Free draining.
Final void	▪ Minimise the size and depth of the final void as far as reasonable and feasible, with its floor a minimum of 5 metres above the predicted long-term groundwater level.
Project infrastructure	▪ To be decommissioned and removed, unless the Executive Director, DRE agrees otherwise.
Community	▪ Minimise the adverse socio-economic effects associated with mine closure.

4.2 DOMAIN REHABILITATION OBJECTIVES

In order to achieve the broad rehabilitation objectives presented in PA 10_0059, Whitehaven have developed specific domain rehabilitation objectives.

The key rehabilitation objectives for each of the domains identified in **Table 11.**

Table 11 Rehabilitation Domain Objectives

Mining Domain	Final Land Use Domain	Rehabilitation Objective
1. Infrastructure Area	I. Infrastructure	All surface infrastructure has been decommissioned and removed, unless approved otherwise by the Secretary All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community and is approved by the Secretary for retention. Domain safe and free from hazardous materials.
	A. Native ecosystem (Rehabilitation areas – Woodland)	Stable and permanent landform established. Final landform non-polluting. Vegetation consistent with the White Box Grassy Woodland or Brigalow Woodland. Soils, hydrology, and woodland (Grassy and Shrubby White Box Woodland*) ecosystem with maintenance needs no greater than those of a local analogue site.
	B. Agricultural – Grazing (Rural Land Capability Class III)	The area does not represent an erosion hazard. Land capability similar to existing land capability (Class III).
3. Water Management Area	F. Water Management Area G. Water Storage	Domain stable and non-polluting. No active erosion.
	A. Native ecosystem (Rehabilitation areas – Woodland)	Stable and permanent landform established. Final landform non-polluting. Vegetation consistent with the White Box Grassy Woodland.
	B. Agricultural – Grazing (Rural Land Capability Class III)	The area does not represent an erosion hazard. Land capability similar to existing land capability (Class III).
4. Overburden Emplacement Area	A. Native ecosystem (Rehabilitation areas – Woodland)	Stable and permanent landform established. Runoff and/or leachate from the landlord are non-polluting. Vegetation consistent with the White Box Grassy Woodland or Brigalow Woodland.
5. Active Mining Area (Open cut void)	A. Native ecosystem (Rehabilitation areas – Woodland)	Final landform safe, stable and secure. Runoff and/or leachate from the landform are non-polluting. Vegetation consistent with the White Box Grassy Woodland.
*Grassy White Box Woodland EEC equivalent		

4.3 COMPLETION CRITERIA

Completion criteria are objective target levels or values assigned to a variety of indicators (e.g., slope, species diversity, percent groundcover), which can be measured to demonstrate progress and ultimate success of rehabilitation. As such, they provide a defined end point, at which point in time rehabilitation can be deemed successful and the lease relinquishment process can proceed. The rehabilitation completion criteria for all areas Werris Creek are listed in **Table 12.**

These completion criteria will be utilised to demonstrate achievement of rehabilitation objectives. It is noted that the completion criteria may be subject to refinement as rehabilitation progresses, including as a result of ongoing consultation with the relevant stakeholders, studies yet to be completed and continuous improvement process informed by rehabilitation monitoring results. The achievement (or otherwise) of the completion criteria will be monitored and reported as required.

Closure criteria have been informed by the following information:

- Relevant conditions of PA 10_0059;
- The Department of Regional NSW – Mining, Exploration & Geosciences (DRNSW – MEG) rehabilitation guideline documents including:
    - Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines;
    - Guideline: Rehabilitation objectives and rehabilitation completion criteria;
- Completion criteria from the previously approved Werris Creek Closure MOP;
- Similar rehabilitation projects; and
- Specific information collected to date during detailed planning investigations.

It is noted that the rehabilitation completion criteria for WCCM will remain in Draft until approved by the RR.

Table 12 Rehabilitation Completion Criteria

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
Phase 1 - Decommissioning					
Infrastructure Areas					
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	Infrastructure	All surface infrastructure has been decommissioned and removed, unless approved otherwise by the Secretary	Removal of all services (power, water, communications) that have been connected on the site as part of the operation.	All utility infrastructure removed.	Statement provided, utility service disconnection record / notification
			Demolition and removal of all surface infrastructure that is not required for the final land use.	Infrastructure removed.	Statement provided Demolition records As-constructed final landform
			Removal of all concrete footings, foundations and pavements	All concrete footings, foundations and pavements have been removed	Demolition records Surveyed verification and marked on the as-constructed final landform plan.
			Surveying and sealing of all drill holes and exploration boreholes in accordance with departmental guidelines and relevant standards.	Sealing completed and verified.	Engineering report/statement that verify complete to departmental guidelines and relevant standards.
Infrastructure	Infrastructure	Retention of infrastructure (if applicable): All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community and is approved by the Secretary for retention.	Potential hazards (e.g., electrical, mechanical) have been effectively isolated and secured	Hazards isolated and secured.	Statement provided by suitably qualified engineer.
			Damage to access tracks has been repaired and stabilised.	Repairs complete.	As-constructed final landform plan, photos etc.
			Appropriate approvals have been sought and granted for retained infrastructure	Approval in place	Approval from the Secretary
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	Infrastructure	All hazardous and contaminated materials are appropriately removed or remediated	Waste material and/or visible contamination areas on site surface.	There are no visible signs of contamination following the removal of plant, equipment and materials. All rubbish/ waste materials have been removed from site.	Statement provided and before/after photos. Waste disposal records
			Soil testing for contaminants of concern as listed by Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999) (NEPM) applicable to land use type.	Contamination has been appropriately remediated, removed or managed so that appropriate guidelines for land use are met, e.g., Health Investigation Level (HIL) or Ecological Investigation Level (EIL) of the NEPM (1999).	Soil testing results and Remediation Report
			Carbonaceous material is removed from the footprint of the infrastructure areas	Any carbonaceous material has been removed from the footprint of the infrastructure areas and disposed of in the void, with at least 3m cover.	Photographs, Rehabilitation monitoring reports, as-constructed surveys, quality assurance records, Test pitting records
Water Management Area					
Water management area	Water management area	All water management infrastructure has been decommissioned and removed, unless approved otherwise by the Secretary	Removal of all water management infrastructure (including pumps, pipes and power).	Infrastructure removed.	Survey verification records Statement provided

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
Water management area Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	Water management area Water Storage	Domain stable and non-polluting	Mine water dams and sediment dams that are planned to remain post closure are decontaminated as required prior to conversion to clean water dams or backfilled to form part of the final landform.	Contaminated sediment accumulated in mine water and sediment dams is removed and emplaced in the final depression with adequate inert cover, supported by records.	Statement provided Rehabilitation records
All other mining domains					
All domains	All domains	All surface infrastructure, plant and equipment has been decommissioned and removed, unless approved otherwise by the Secretary	Removal of all plant, equipment and associated equipment from the footprint of mining areas	Infrastructure and equipment (including mobile equipment) removed	Statement provided Demolition /decommissioning records As-constructed final landform
Phase 2 – Landform Establishment					
All domains					
All domains	All domains	Stable and permanent landform established	Landforms are surveyed and demonstrated to be constructed in accordance with the Final Landform Plan.	Survey verifies final landform construction in accordance with the Approved Final Landform plan	As constructed surveys As constructed surveys and plans
			Rehabilitated slopes are generally less than 10 degrees	Survey verifies slopes are generally less than 10 degrees	As constructed surveys
			Landform stability and erosion	Survey or remote sensing of the rehabilitated landforms shows an absence of slumping that could compromise stability.	Survey or remote sensing monitoring
		Final Landform non-polluting	No polluted or contaminated runoff from the landform	Water quality measured at discharge points and downstream monitoring locations in generally consistent with water quality in surrounding waterways. Monitoring indicated that surface water complies with the *Water Quality Guidelines* (2018trigger value for livestock (cattle) or analogue monitoring site	Observation post rainfall Water quality sampling and analyses as per the approved *Water Management Plan*
		Final landform is sympathetic to surrounding topography, minimising visual impacts	Visual assessment and as constructed survey	Visual assessments and as constructed survey verify the constructed landform blends with the surrounding topography	As constructed survey and plans
Water Management and Storage Areas					
Water Management Area	Water Management Area	Domain stable and non-polluting	Redundant water management structures backfilled	No pooling of water over site following rainfall	Observation/Photographs As constructed survey and plans

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
			Remaining water management structures non-polluting	Monitoring indicated that surface water complies with the *Water Quality Guidelines* (2018) trigger value for livestock (cattle) or analogue monitoring site	Water quality testing as per the approved *Site Water Management Plan*
		Water Approvals Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed (e.g., under the Water Management Act 2000) and where required ensure sufficient licence shares are held in the water source(s) to account for water take.	Water approvals	Water approvals / licences are granted by relevant NSW Government Agency. Less than 10% or runoff water is captured on site	Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted. Site water catchment and survey plans demonstrate compliance to runoff capture volumes
Overburden emplacement areas					
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	Overburden emplacement area	Stable, free draining and permanent landform established	Landforms are surveyed and demonstrated to be constructed in accordance with the Final Landform Plan.	Survey verifies final landform construction in accordance with the Approved Final Landform plan	As constructed survey plans
			Rehabilitated slopes are generally less than 10 degrees	Survey verifies slopes are generally less than 10 degrees	As constructed surveys
			Suitable surface water controls installed and operating effectively	Monitoring of water discharged from the Mine complies with EPL limits No identifiable erosion or sedimentation	Water quality testing as per the approved *Site Water Management Plan* Photographs Rehabilitation monitoring reports
All domains	Overburden emplacement area	Runoff and/or leachate from the landform is non-polluting	Water quality of runoff is non-polluting	Monitoring indicated that surface water complies with the *Water Quality Guidelines* (2018) trigger value for livestock (cattle) or analogue monitoring site	Sampling and analyses of runoff
Active Mining Area (Open Cut Void)					
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	Active Mining Area (Open Cut Void)	The size, depth and slopes of the final void have been minimised and are in accordance with the approved final landform	Landforms are surveyed and demonstrated to be constructed in accordance with the final landform	Survey verifies final landform construction in accordance with the Approved Final Landform plan	As constructed survey plans
			Slopes of southern perimeter and floor are generally less than 1810 degrees	Survey verifies slopes are generally less than 18 degrees	As constructed survey plans
			Rehabilitated slopes are generally less than 18 degrees	Survey verifies slopes are generally less than 18 degrees	As constructed survey plans
			The final depression is backfilled with its floor a minimum of 5 m above the predicted long-term groundwater level	Survey verifies depth of the final depression is backfilled with its floor a minimum of 5 m above the predicted long-term groundwater level	As constructed survey plans
		Final depression is safe and stable	Final depression geotechnically stable	Geotechnical report indicating no unacceptable risk of instability	Independent engineers report

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
			There is no evidence of slumping or uncontrolled erosion that could compromise stability	Survey or remote sensing of the rehabilitated landforms shows an absence of slumping that could compromise stability.	As constructed survey plans
			Erosion is assessed to be not compromising landform stability prior to commencement of growth medium development phase.	Survey or remote sensing of the rehabilitated landforms shows an absence of erosion >300mm deep that could compromise stability.	Survey or remote sensing monitoring
			Suitable surface watercontrols installed and operating effectively	Monitoring indicated that surface water complies with the *Water Quality Guidelines* (2018) trigger value for livestock (cattle) or analogue monitoring site No identifiable erosion or sedimentation.	Water quality testing as perthe approved *Site Water Management Plan* Photographs
		There is no evidence of spontaneous combustion which may present a risk to the final landform or final land use	There is no evidence of spontaneous combustion prior to commencement of growth medium development phase.	Heat monitoring verifies no evidence of spontaneous combustion or heating in the final depression	Heat monitoring results.
		Carbonaceous material is appropriately covered and capped	All coal and carbonaceous material are covered and capped with inert material	All coal and carbonaceous material are capped with a minimum of 3m of inert overburden, subsoil and topsoil.	As constructed survey plans, test pits
Phase 3 – Growth Medium Development					
All Domains					
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	All domains	Growth media is appropriate to support the final land use	Soil thickness on shapedlandform	Rehabilitation records verify that rehabilitation areas subsoil with a nominal depth 100-200 mm, where available.	Rehabilitation records Test pits As constructed survey
				Rehabilitation records verify that rehabilitation areas include subsoil and topsoil with a nominal depth of 100–200400 mm, where available.	Rehabilitation records As constructed survey
			Soil characteristics in the range of pre-mining soil characteristics	Monitoring verifies soil characteristics are in the range of analogue sites or do not appear to be limiting plant performance.	Soil monitoring report outliningthe results of physical and laboratory soil tests
			Ameliorant application.	Soil ameliorants are applied where necessary (supported by records, topsoil analysis).	Rehabilitation records

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
		The rehabilitated area does not represent an erosion hazard	Suitable surface watercontrols installed and operating effectively	Monitoring indicated that surface water complies with the *Water Quality Guidelines* (2018) trigger value for livestock (cattle) or analogue monitoring site. No identifiable erosion or sedimentation	Water quality testing as pe rthe approved *Site Water Management Plan* Photographs
Phase 4 – Ecosystem and Land Use Establishment					
All domains					
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	All domains	Weeds and feral animals do not present a risk to rehabilitation.	Weed presence	Number of weed species and abundance average no greater than 20% more than that of analogue sites	Rehabilitation monitoring reports
			Feral animal density	Monitoring records indicate that feral and pest animal species abundance is no greater than surrounding lands.	Rehabilitation monitoring reports
		Erosion does not present a safety hazard or compromise the post-mining land capability.	Erosion control	Visual monitoring indicates there is no significant erosion that compromises land capability or the intended final land use.	Rehabilitation monitoring reports
				Monitoring verifies there are no gully or tunnel erosion features, or rills >300 mm deep or wide.	Rehabilitation monitoring reports
Native ecosystem (Rehabilitation areas – Woodland) or Agricultural – Grazing (Rehabilitation Area – Pasture)	All domains	Bushfire: The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented.	Bushfire controls implemented similar to surround land management on similar vegetation communities	Rehabilitation monitoring reports. Statement provided and.
Water Management Area					
Water Management Area	Water Management Area	Domain stable and non-polluting	Water management structuresstabilised and capable of retaining and conveying waterwithout causing pollution	No identifiable erosion or sedimentation (Need smart criteria) like >300mm erosion or more than 250mm deposition??	Survey or remote sensing monitoring Photographs
			Water discharged from sitewithin relevant criteria	Monitoring indicated that surface water complies with the *Water Quality Guidelines* (2018) trigger value for livestock (cattle) or analogue monitoring site	Water quality testing as perthe approved *Water Management Plan*
Native ecosystem (Rehabilitation areas – Woodland)					

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
Native ecosystem (Rehabilitation areas – Woodland)	All domains	At least 280 ha of White Box-Yellow Box-Blakely's Red Gum Woodland EEC has been established in accordance with PA 10_0059	Area of woodland rehabilitation	Rehabilitation records and landform survey verifies that at least 280 ha of rehabilitation areas have been reseeded with White Box-Yellow Box-Blakely's Red Gum Woodland EEC seed mix at the nominated seeding rate.	Rehabilitation records
		At least 180 ha of shrubby woodland has been maintained or established in accordance with PA 10_0059	Area of shrubby woodland	Rehabilitation records and landform survey verifies that at least 180 ha of shrubby woodland have been established or maintained.	Rehabilitation records Annual ecological reports (Rehabilitation Monitoring)
		Woodland rehabilitation revegetation will be compatible with surrounding land uses, restore ecosystem function and consist of White Box-Yellow Box-Blakely's Red Gum Woodland EEC for Grassy White Box Woodland EEC equivalent community	Native species richness	Rehabilitation monitoring verifies that native ecosystem indicators have achieved the completion criteria targets listed in **Table 13.**	Rehabilitation monitoring records.
			Native overstorey cover		
			Native mid storey cover		
			Native ground cover (grasses)		
Agricultural – Grazing (Rehabilitation Area – Pasture)					
Agricultural – Grazing (Rehabilitation Area – Pasture)	All domains	Re-establishing agricultural land over the areas disturbed by the mine. Pasture areas will be compatible with surrounding land uses and capable of sustaining grazing with land capability that reflects the pre-mining environment, supporting economically viable grazing operations	Area of pasture rehabilitation	Rehabilitated pasture areas have been sown with a mixture of pasture species including fast growing, short- lived species and perennial grasses and legumes.	Rehabilitation records
			Species selection	Rehabilitation areas comprise a mixture of grasses representative of regionally occurring vegetation where possible. Grasses sown will be selected from those listed in the RMP.	Rehabilitation records Rehabilitation monitoring reports
			Vegetation establishment	Rehabilitation monitoring records verify that ground cover (vegetation, leaf litter, and mulch) is at least 85%. The first monitoring program will be completed within 12 months to 18 24 months of rehabilitation to quantify pasture crop establishment.	Rehabilitation monitoring records. Agricultural/Grazing/Economic assessments
				No bare surfaces >20 m^2 in area or >10 m in length down slope as indicated by rehabilitation monitoring at Year 5 following establishment.	Rehabilitation monitoring reports

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
			Vegetation health	Rehabilitation monitoring shows that pasture health is comparable to analogue sites.	Rehabilitation monitoring reports
		Grazing stock is excluded from rehabilitation areas and enrichment zones prior to relinquishment.	Stock exclusion fencing	Rehabilitation areas and enrichment zones are fenced to exclude grazing stock (until stable and grazing will not impact upon its establishment).	Rehabilitation records Photographs
Phase 5 – Ecosystem and Land Use Development					
All domains					
All domains	All domains	Weeds are controlled.	Weed presence	Number of weed species and abundance average no greater than 20% more than that of analogue sites	Rehabilitation monitoring reports
All domains	All domains	Feral animal pests are controlled	Feral animal density	Monitoring records indicate that feral and pest animal species abundance is no greater than surrounding lands.	Rehabilitation monitoring reports
All domains	All domains	Erosion does not present a safety hazard or compromise the post-mining land capability.	Erosion and sediment control	There are no gully or tunnel erosion features and there is an absence of rilling (> 300 mm deep) within each domain.	Rehabilitation monitoring reports
		Monitoring demonstrates soil profile development in rehabilitated areas (e.g., development of organic layer, litter layer).	Soil quality	Soil testing indicates that topsoil soil characteristics (pH, EC [electrical conductivity], ESP) generally meet the following criteria: - pH – between 4.5 and 8.5, or is comparable to relevant analogue sites; - EC - < 1 dS/m, or is comparable to relevant analogue sites; and - ESP – that is comparable to the analogue sites. Where soil testing results indicate values outside the above criteria, rehabilitation monitoring at the relevant area verifies that the soil quality is not inhibiting plant growth.	Soil monitoring and testing reports Rehabilitation monitoring reports
			Surface cover	Rehabilitation monitoring records verify that ground cover (vegetation, leaf litter, and mulch) is similar to analogue sites greater than 85 %.	Rehabilitation monitoring reports

Final Land Use Domain	Mining Domain	Rehabilitation Objective *(Describe the desired feature and/or characteristics of the final land use domain)*	Indicator *(Specific attribute associated with the objective)*	Rehabilitation Completion Criteria *(Benchmark for the indicator, based on analogue data where appropriate)*	Example Justification Validation Method *(Evidence that the benchmark has been achieved)*
Water Management Area					
Water management areas	Water management areas	Final landform drainage will integrate with surrounding catchments, achieve long-term geomorphic stability and minimise erosion.	Discharge water quality	Discharge water quality meets EPL requirements.	Rehabilitation monitoring reports
			Geomorphic stability	Water management structures are assessed to be stable	Geotechnical reports
Native ecosystem (Rehabilitation areas – Woodland)					
Native ecosystem (Rehabilitation areas – Woodland)	All domains	Woodland rehabilitation revegetation White Box-Yellow Box-Blakely's Red Gum Woodland EEC for Grassy White Box Woodland EEC equivalent community	Native species richness	Rehabilitation monitoring verifies that native ecosystem indicators have achieved the completion criteria targets listed in *Table 14*.	Rehabilitation monitoring records.
			Native overstorey Density cover		
			Native mid storey cover		
			Native ground cover (grasses)		
			Native vegetation cover		
Agricultural – Grazing (Rehabilitation Area – Pasture)					
Agricultural – Grazing (Rehabilitation Area – Pasture)	All domains	Pasture areas will be capable of sustaining grazing with land capability that reflects the pre-mining environment.	Species composition	Rehabilitation monitoring verifies that species in pasture rehabilitation areas comprise a mixture of grasses representative of pasture vegetation.	Rehabilitation monitoring records.
			Regeneration	Established species survive and/or regenerate after disturbance	Rehabilitation monitoring records.
				Species are capable of setting viable seed, flowering or otherwise reproducing.	Rehabilitation monitoring records.
			Vegetation health	Rehabilitation monitoring verifies that vegetation health is comparable to reference sites.	Rehabilitation monitoring records.
			Land capability	Pasture areas are assessed to have a Rural Land Capability Class III or better, consistent with the final landform	Rehabilitation monitoring records.

Table 13 Rehabilitation Completion Criteria for Werris Creek – Phase – Ecosystem Establishment

Phase – Ecosystem and land use Establishment (Rehabilitation areas Woodland)*		Methodology	Benchmark*	Initial establishment monitoring (12 to 24 months)	2 to 10 years	Justification Validation Method *(evidence that the benchmark has been achieved)*	Comment
Vegetation consistent with White Box-Yellow Box-Blakely's Red Gum Woodland equivalent	Native Species Richness	Measured following BBAM methodology will target 80% of the Analogue Site average.	Minimum Target	At least 20 individuals per 20x20 plots	At least 28 individuals per 20x20 plots	Rehabilitation monitoring records.	Targets are set to allow for ecosystem and land use establishment phase to achieve the minimum value recorded in the Analogue sites in the first 2 years and achieving analogue site targets within 10 years.
	Abundance of Species that will contribute to Native overstorey density	Measured following BBAM methodology will target 80% of the Analogue Site average.	Minimum Target	At least 4 individuals per 20x20 plots	At least 5 individuals per 20x20 plots	Rehabilitation monitoring records.	
	Abundance of Species that will contribute to Native Mid-storey Cover	Measured following BBAM methodology will target 80% of the Analogue Site average.	Minimum Target	At least 1 species present per 20x20 plots	At least 1 species present per 20x20 plots	Rehabilitation monitoring records.	
	Native Vegetation Cover (Grasses)	Measured following BBAM methodology will target 80% of the Analogue Site average.	Minimum Target	30%	44%	Rehabilitation monitoring records.	
	Native Vegetation Cover	Measured following BBAM methodology will target 80% of the Analogue Site average.	Minimum Target	40%	60%	Rehabilitation monitoring records.	
*** Targets set based on 2021 analogue data Werris creek. This Criteria will be review in 2023**							

Table 14 Rehabilitation Completion Criteria for Werris Creek – Phase – Ecosystem Development

Phase – Ecosystem and land use Development		Methodology	Benchmark*	Local Reference (Analogue) (80%)	Justification Validation Method *(evidence that the benchmark has been achieved).*
Woodland rehabilitation of approximately 26 ha revegetation for White Box grassy woodland (BVT BR388 and PCT 589)*589	Native Species Richness	Species present per 20x20 plots	Mean Target	36	Rehabilitation monitoring records.
			Minimum Target	28	Rehabilitation monitoring records.
	Native Overstorey Density tress >2m	Species present per 20x20 plots	Mean Target	5	Rehabilitation monitoring records.
			Minimum Target	4	Rehabilitation monitoring records.
	Native Mid-storey Cover	Measured following BBAM methodology	Mean Target	7.90%	Rehabilitation monitoring records.
			Minimum Target	6.30%	Rehabilitation monitoring records.
	Native Groundcover (Grasses)	Measured following BBAM methodology	Mean Target	54%	Rehabilitation monitoring records.
			Minimum Target	43%	Rehabilitation monitoring records.
	Native vegetation cover	Measured following BBAM methodology .	Mean Target	80%	Rehabilitation monitoring records.
			Minimum Target	66%	
* Targets set based on 2021 analogue data Werris creek. This Criteria will be review in 2023					

4.4 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA – STAKEHOLDER CONSULTATION

4.4.1 STAKEHOLDER ENGAGEMENT PLAN

WCC has prepared a Stakeholder Engagement Plan (SEP) to facilitate stakeholder consultation for Werris Creek's rehabilitation objectives and completion criteria. This document details Werris Creek's stakeholders and the strategies used to communicate with them and provide the foundation for working with stakeholders prior to and during the closure process. The SEP will be regularly revised to reflect the outcomes of technical investigations, the ongoing development and execution of this RMP and the outcomes of ongoing engagement.

Since the commencement of rehabilitation and closure planning for Werris Creek, Whitehaven has consulted with regulatory authorities including RR as well as relevant landholders as summarised in **Table 15**.

4.4.1.1 RELEVANT STATUTORY AUTHORITIES

Whitehaven has consulted with and will continue to consult with the following regulatory bodies in relation to the WCC operations and rehabilitation:

- Department of Agriculture, Water and the Environment (DAWE);
- DPE;
- Environment and Heritage Group in the DPE;
- DPE – Water;
- Environment Protection Authority;
- Resources Regulator;
- Department of Primary Industries (Office of Agricultural Sustainability and Food Security (OASFS); and
- Liverpool Plains Shire Council (LPSC).

4.4.1.2 OTHER KEY STAKEHOLDERS

WCC has consulted with and will continue to consult with a number of community groups and landholders, including:

- Association of Mining Related Council;
- Aboriginal stakeholder groups (including Nungaroo Local Aboriginal Lands Council);
- Local community and affected landowners;
- Community groups (including CCC); and
- Staff, contractors and unions.

4.4.1.3 COMMUNITY CONSULTATIVE COMMITTEE

A Community Consultative Committee (CCC) operates in accordance with Schedule 5, Condition 5 of PA 10_0059 with an Independent Chairperson nominated to facilitate the meetings. The Committee meets quarterly and consists of local Werris Creek community members and Werris Creek employees.

4.4.2 SUMMARY OF STAKEHOLDER ENGAGEMENT COMPLETED TO DATE

Whitehaven routinely engages with stakeholders in regard to the rehabilitation and mine closure.

The MOPs, including the most recent (Mining Operations Plan Werris Creek Coal Mine 30 November 2015 – 30 November 2022) included engagement with the local communities and stakeholder groups regarding final land use and rehabilitation expectations.

All issues raised in the consultation process for the Project EA were comprehensively addressed in the approval process and are reflected in the commitments in the Project EA Statement of Commitments and PA 10_0059 conditions.

Table 15 presents a high-level summary of the additional key consultation undertaken for the project to date.

Table 15 Consultation Summary to Date

Stakeholder	Date	Issues Raised
DPE, LPSC, EPA, DPI Water, OASFS and RR	19 February 2015	DPIE, LPSC, EPA, DPI - Water, RR and OASFS were contacted on 19 February 2015 to present details of proposed modifications to operations at Werris Creek Mine, the catalyst for the preparation of the MOP.
CCC	February 2015	The proposed modifications to mining operations were in the discussed at the February 2015 CCC Meeting. No specific issues related to these operations were raised. It is noted that a motion was carried by the CCC to Support the Proponent's application to use void water for beneficial agricultural purposes. The proponent is cognisant of the community's general concerns over noise, blasting and dust emissions.
DPE	April 2020	The proposed modification (MOD 3) to update the general mine layout incorrectly depicted in Appendix 2 of the consent was discussed with DPE.
EPA and CCC	February 2021	The proposed modification (MOD 4) to dispose of end-of-life tyres within overburden emplacements was informed by correspondence received from the EPA regarding Environmental Assessment requirements. The modification was also discussed at the March 2021 CCC Meeting.

4.4.3 PROPOSED FUTURE CONSULTATION

Consultation will continue with stakeholders during the life of mine, in accordance with the SEP. **Table 16** presents a summary of the proposed future consultation activities key stakeholders.

Table 16 Summary of Proposed Future Stakeholder Engagement Activities

Stakeholder	Activities
RR	Ongoing revisions of the RMP Submission of the Annual Review and Annual Rehabilitation Report Detailed Mine Closure Planning
DPE	Annual Reviews Ongoing revisions of the RMP Submission of the Annual Review and Annual Rehabilitation Report

	Detailed Mine Closure Planning
CCC	Annual Reviews Ongoing revisions of the RMP Quarterly CCC Meetings Detailed Mine Closure Planning
Agencies	Annual Reviews Ongoing revisions of the RMP Submission of the Annual Review and Annual Rehabilitation Report Detailed Mine Closure Planning
Stakeholder and Community Interest Groups	Ongoing revisions of the RMP Detailed Mine Closure Planning
Registered Aboriginal Parties	Detailed Mine Closure Planning

5 FINAL LANDFORM AND REHABILITATION PLAN

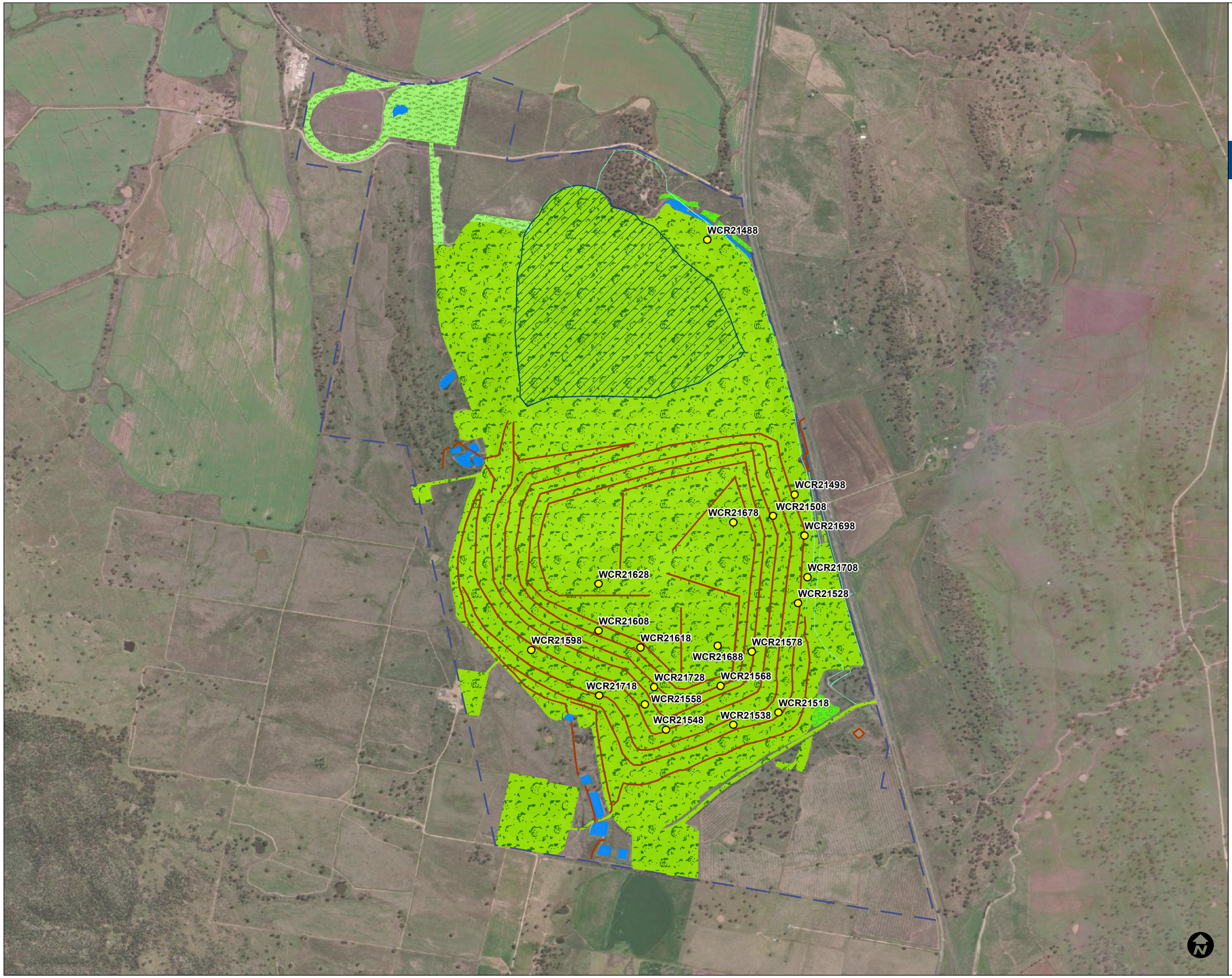
5.1 FINAL LANDFORM AND REHABILITATION PLAN – ELECTRONIC COPY

In accordance with the requirements of the *Form and Way: Rehabilitation Management Plan for Large Mines* (RR, 2021a) a *Final Landform and Rehabilitation Plan* has been prepared to show the proposed final land use and final landform for Werris Creek (refer to **Figure 6** and **Figure 7**).

WHITEHAVEN REHABILITATION MANAGEMENT PLAN

WERRIS CREEK

FLRP PLAN 1: FINAL LANDFORM FEATURES



LEGEND

- Rehabilitation Monitoring Sites
- Project Approval Boundary

Final Landuse Domain

- Agricultural – Grazing
- Rehabilitation Biodiversity Offset Area
- Native Ecosystem
- Water Storage (Excluding Final Void)

Final_Landform_Features

Final Landform Feature

- Drainage Bund
- Drainage Channel
- Final Void Area

0 250 500 Metres

Coordinate System:	GDA2020
Scale:	1:20,000 at A3
Project Number:	630.30294
Date:	27-Jul-2022
Drawn by:	LC

WHITEHAVEN COAL

UAV Image Capture Date: 27th October 2021

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WHITEHAVEN REHABILITATION MANAGEMENT PLAN

WERRIS CREEK

FLRP PLAN 2: FINAL LANDFORM CONTOURS

LEGEND

- Final Landform Contour (2m AHD)
- Project Approval Boundary

0 250 500 Metres

Coordinate System:	GDA2020
Scale:	1:20,000 at A3
Project Number:	630.30294
Date:	28-Jul-2022
Drawn by:	LC

WHITEHAVEN COAL

UAV Image Capture Date: 27th October 2021

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6 REHABILITATION IMPLEMENTATION

6.1 LIFE OF MINE REHABILITATION SCHEDULE

Whitehaven will adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, remaining mining disturbance areas are promptly shaped, top-dressed and vegetated to provide a stable landform.

The life of mine rehabilitation schedule associated with rehabilitation activities has been presented in **Figure 8** and **Figure 9**. The figures illustrate projected rehabilitation status at approximately five-yearly intervals until the completion of decommissioning activities and achievement of the final land use.

6.1.1 INFRASTRUCTURE

There are no further construction activities planned during the LOM for key infrastructure at WCC. It is noted that replacement or refurbishment of existing infrastructure (e.g., oil water separator)may be required. .

Key infrastructure will be decommissioned following the cessation of mining activities, including the infrastructure located within the Mine Facilities Area and Services Corridor. Infrastructure that supports or facilitates the approved post mining land use may not be decommissioned. Planning for infrastructure decommissioning will be included in the detailed mine closure process.

6.1.2 MINING ACTIVITIES

Mining is currently approved at WCC up until 2032 and incorporates the following key activities:

Continued development of coal mining operations in the Willow Tree Formation to facilitate a Run of Mine (ROM) coal production rate of up to 2.5 million tonnes per annum (Mtpa).

Transport of ROM coal is transported internally from the ROM Coal Pad to a Rail Load-Out Facility and despatched along the Main Northern Railway to the Port of Newcastle. 50,000 Coal is also approved to be tonnes of coal is transported by road to domestic customers.

Progressive backfilling of the mine void behind the advancing open cut mining operation with waste rock and minor quantities of reject material; and

Progressive development and use of new haul roads and internal roads, water management infrastructure as well as stockpiles, laydown areas and gravel/borrow areas.

Mining is planned for completion in CY2024.

6.1.3 MINE OPERATIONS

Mine operations at WCC involve open cut mining with a truck and excavator/shovels fleet to produce up to 2.5 Mtpa ROM. Final landform construction and rehabilitation activities are also undertaken progressively after coal removal.

ROM coal is transported to directly to the ROM Coal Pad with coal immediately adjacent to the roof and floor of each seam stockpiled separately for use in blending to produce coal products with a higher ash specification. The ROM coal does not require washing to achieve the coal quality requirements of the product coal. The product coal is transported internally from the Coal Processing Area to a rail load-out facility via a purpose-built rail load-out road. Product coal is loaded to rail wagons via an overhead rail load-out bin and despatched along the Main Northern Railway to the Port of Newcastle.

Mining operations will use overburden and interburden materials to in-fill the mine void behind the advancing open cut, as well as one out-of-pit mine waste rock emplacement (Western Extension) and one in-pit mine rock emplacement (Northern Extension).

The out-of-pit emplacement will continue to be rehabilitated . Water management will be designed by a specialist on the rehabilitated landform to manage surface water runoff and assist in minimising erosion of these slopes.

The in-pit emplacement located within and above the void (the 400m to 445m AHD section of the Overburden Emplacement) will be extended by approximately 250m to the north to provide for an increased capacity of approximately 13.5Mbcm. The low wall of the advancing north face of the in-put emplacement will be constructed with slopes of 18° or less. On the out-of-pit eastern and western slopes, the slopes of the overburden emplacement will be constructed with comparatively gentle slope of approximately 10°. On the outer slopes and final in-pit (northern) slope, existing contour banks will be extended to manage surface water runoff and assist in minimising erosion of these slopes.

6.1.4 MINE PRODUCTION AND REHABILITATION SCHEDULES

The assumptions and principals that have been used to develop the LOM rehabilitation schedule are detailed in **Table 17**.

Table 17 Indicative LOM Mine Production Schedule

Year	Waste Rock (Mbcm)	ROM Coal (Mtpa)
2022	10.4	2.5
2023	6.5	1.5
2024	1	.5
180	**18**	4.5

Importantly, the staging of the open cut mining operations would be determined by the requirements of the coal market, product specification and/or blending requirements. As these requirements are likely to vary over the LOM, the development sequence of the open cut, coal extraction rates and rehabilitation areas may vary.

6.2 LOM REHABILITATION PLANS

WHITEHAVEN FORWARD PROGRAM

WERRIS CREEK

LOM PLAN 1

LEGEND

- Project Approval Boundary
- Ecosystem and Land Use Establishment

0 250 500 Metres

Coordinate System:	GDA2020
Scale:	1:20,000 at A3
Project Number:	630.30268
Date:	27-Jul-2022
Drawn by:	LC
Annual Reporting Period:	2024

WHITEHAVEN COAL

UAV Image Capture Date: 27th October 2021

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WHITEHAVEN REHABILITATION MANAGEMENT PLAN

WERRIS CREEK

LOM PLAN 2

LEGEND

- Project Approval Boundary

Final Landform Feature

- Drainage Bund
- Drainage Channel
- Final Void Area

Final Landuse Domain

- Agricultural – Grazing
- Rehabilitation Biodiversity Offset Area
- Native Ecosystem
- Water Storage (Excluding Final Void)

0 250 500 Metres

Coordinate System:	GDA2020
Scale:	1:20,000 at A3
Project Number:	630.30294
Date:	27-Jul-2022
Drawn by:	LC

WHITEHAVEN COAL

UAV Image Capture Date: 27th October 2021

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6.3 PHASES OF REHABILITATION AND GENERAL METHODOLOGIES

Achievement of a physically and chemically stable mine landform that is adequately drained and integrates with the adjoining hilly topography will be demonstrated through the implementation of a series of conceptual rehabilitation phases. As defined by the *Form and way: Rehabilitation Management Plan (large mines)* the rehabilitation phases are presented in **Table 18.**

Table 18 Rehabilitation Phases

Rehabilitation Phase	Description
Phase 1: Active Mining	This phase is associated with active mining operations across the domains.
Phase 2: Decommissioning	This phase of rehabilitation includes activities associated with the removal of mining infrastructure, unless agreed to be retained, and the removal, remediation or management of contaminated and hazardous materials.
Phase 3: Landform Establishment	This phase of rehabilitation consists of the processes and activities required to construct the approved final landform. In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (that is, rock raking or ameliorating sodic materials).
Phase 4: Growth Medium Development	This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short-lived pioneer species) to ensure achievement of the approved or, if not yet approved, the proposed: - rehabilitation objectives; - rehabilitation completion criteria; and - final landform and rehabilitation plan. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.
Phase 5: Ecosystem and Land Use Establishment	This phase of rehabilitation consists of the processes to establish the final land use following construction of the final landform. For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control.
Phase 6: Ecosystem and Land Use Development	This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved or, if not yet approved, the proposed: - rehabilitation objectives; - rehabilitation completion criteria; and - final landform and rehabilitation plan. For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile. This

Rehabilitation Phase	Description
	phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.
Phase 7: Rehabilitation Completion (sign-off)	The final phase of rehabilitation when a rehabilitation area has achieved the final land use for the mining area: - as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria; and - as spatially depicted in the approved final landform and rehabilitation plan. Rehabilitation areas may be classified as complete when the RR has determined in writing that rehabilitation has achieved the final land use following submission of the relevant application by the lease holder.

6.3.1 ACTIVE MINING PHASE

Appropriate strategies must be implemented during the active phase of mining to enhance rehabilitation outcomes. Works in this phase are summarised below.

Soils and Materials

Management protocols for soils and subsoils are implemented to minimise risks and enable soil resources within disturbance areas to be characterised, stripped, stockpiled and re-used appropriately. The management protocols also enable consideration of the main soil types observed within the project disturbance boundary and any specific constraints or management measures to be adopted for each soil type.

Soil Resources

A Soil and Land Capability Impact Assessment was undertaken by GSS Environmental on behalf of Werris Creek Coal Pty Ltd. **Table 19** shows the three soil units that were identified within areas of the Project Site that were undisturbed by open cut mining activities:

- Brown Chromosol (73 ha);
- Stoney Brown Chromosols (114 ha); and
- Dark Brown Vertosol (205 ha).

Table 19 Soil Types

Australian Soil Classification Orders	Australia Soil Classification Suborders	Description
Chromosol	Brown	Description: Brown Chromosol soils generally consist of light brown to brown loamy sands to loams overlying an abrupt change to yellowish brown to brown clays. The moderately drained upper soil layers range from the slightly acidic to neutral, while the poor drained subsoils range from slight alkaline to alkaline. The soils are non-saline with moderate fertility characteristics. The soil is non-sodic throughout the profile.

Australian Soil Classification Orders	Australia Soil Classification Suborders	Description
		Location: These soils covered 72.50 ha within the Project Site and were found on the upper, mid and waning lower slopes. Management: The top 0.30 m of this soil is suitable for stripping and reuse as topdressing in rehabilitation. The subsoil is not recommended for reuse in rehabilitation due to the limiting factor of high clay content
	Stoney Brown	Description: Stoney Brown Chromosol soils generally consist of stony brown loamy sands overlying a clear change to light brown stony clays. These moderately drained soil layers range from slightly alkaline to alkaline at depth. The soils are non-saline with moderate fertility characteristics. The soil is non-sodic throughout the profile. Location: These soils covered 34.16% or 144.06 ha within the Project Site and were found on upper slopes and crests. Management: This soil is considered unsuitable for stripping and therefore not recommended for reuse as topdressing in rehabilitation. The key limiting factor for this soil is the high stone content throughout the profile. This soil requires only the standard erosion and sediment control measures if disturbed.
Vertosol	Dark Brown	Description: Dark Brown Vertosol soils generally consist of well-structured dark brown silty clay loam to clay trending to massive brown to dark greyish brown clay. These poorly drained soil layers range from slightly alkaline to strongly alkaline at depth. The soils are non-saline with strong fertility characteristics. The soil is non-sodic throughout the profile. Location: These soils covered 48.64% or 205.10 ha within the Project Site and were found on lower slopes and plains. Management: The top 0.30m of soil is considered suitable for stripping and for reuse as topdressing in rehabilitation. The key limiting factor for the lower layers of the soil profile is the high clay content, massive structure and strong alkalinity, whilst in the eastern section of the Project Site, the limiting factor is weathered basalt rock from 0.35 m.

Brown Chromosol and Dark Brown Vertosol topsoil are stripped to depths of 30cm for use in rehabilitation. Stoney Brown topsoils are not stripped but treated as overburden. No subsoil stripping is now undertaken as there is sufficient subsoil stockpiled to meet future rehabilitation requirements. There are adequate subsoil and topsoil resources contained in both stockpiled material and in situ soil yet to be stripped, to meet the rehabilitation objectives for the LOM Project.

a. Soil Resources and Balance

The available soil resource for rehabilitation has been re-assessed in 2022 and presented in **Table 20.**

Table 20 Agriculture – Native Woodland, Pasture

Soil Type	Approximate Volume (m^3)	Demand (m^3)	+ Surplus / - Deficit (m^3)
Topsoil	848,452	602,409	246,043
Subsoil		254,419	-254,419
Total	848,452	856,828	-8,376

As outlined in **Table 20**, growth medium available onsite for rehabilitation will total 848,452m³ which has been calculated as deficient of 8,376m³ to undertake the remaining site rehabilitation. Deficit is in subsoil.

To make up the deficit 7.4ha is to be stripped in 2022. Stripping of the area will include 0.3m of topsoil giving an extra 7,400m³ of topsoil above what will be required to rehabilitate the additional disturbed area. Additionally, 37,000m³ of subsoil will be recovered from the area which will give a surplus of growth medium for final rehabilitation.

Management

Topsoils and subsoils will be stripped to a depth determined by site specific soil testing and documented in the site-specific soil stripping plans. Earthmoving plant operators will be supervised to ensure that stripping operations are conducted in accordance with the stripping plan and in situ soil conditions. The process summarised below for stripping topsoil will be followed:

- The area to be stripped of soil will be clearly demarcated and surveyed;
- Soil will not be stripped during excessively wet or dry conditions;
- Where practical, stripped material will be placed directly onto reshaped overburden and spread immediately (if mining sequences, equipment scheduling, and weather conditions permit) to avoid the requirement for stockpiling and costs with double handling;
- As part of the planning process, sufficient area for stockpiling or placement of soil have been identified and these areas will be accessible;
- Different soil types will be stripped separately, where feasible;
- As part of the planning process, temporary drainage, sediment control and structures to prevent erosion will be implemented for each area if required; and

- Grading or pushing soil into shallow windrows with graders or dozers will be undertaken for later collection by open bowl scrapers or loading into rear dump trucks by front-end loaders.

Where practicable, soil stripped from each vegetation community will be used in areas identified for rehabilitation. Where soil cannot be used for rehabilitation immediately it will be stockpiled wherever practicable

Where topsoil is unavailable or of insufficient quality, subsoil or mine spoil may be able to be ameliorated to form a suitable growing media. The pre-disturbance soil testing program and the rehabilitation monitoring and research activities will be used to determine whether subsoil amelioration is practicable.

b. Flora

Management

Risks of impacts to flora are avoided, mitigated and managed through the implementation of life of mine planning as well as pre-clearing and clearing protocols. LOM planning has limited impacts to flora through the placement of overburden within the completed section of the open cut.

There are no further pre-mining clearing activities planned beyond 2022. Previous clearing activities was undertaken in advance of mining on a campaign basis. WCCM implement a Clearing Checklist to manage the clearing process and to document all licensing, safety and management requirements.

The Permit to disturb has a Clearing Checklist, which is an environmental checklist that must be completed for prior to clearing by personnel responsible for the clearing activities, the relevant technical expert (e.g., Electrical Engineer to confirm no presence of cables, etc.) and signed off by the site's Environmental Officer or a delegate.

Resources

Native seed collection is undertaken at WCCM. Seed Collection is undertaken in accordance with the WCCM Biodiversity and Offset Management Plan and follows the principles developed by Ralph (2000) and Florabank (2008). These principles include:

- Obtaining the necessary permits and property permission (where required);
- Avoiding or minimise damage to sites and native vegetation;
- Collecting local provenance seed to maintain genetic diversity; and
- Labelling seeds and storing correctly.

c. Fauna

Management

Fauna is managed to minimise impacts and ensure rehabilitation objectives and outcomes related to biodiversity enhancement are achieved.

Minimising impacts to fauna are achieved through the implementation of management strategies detailed in the WCC BMP. Key strategies relevant to mine rehabilitation, include:

- Clearing has been subject to a pre-clearance survey by an appropriately qualified ecologist to ensure clearing activities are managed to minimise impacts on fauna;
- If required, fauna relocations are completed in consideration of recommendations from an appropriately qualified ecologist;
- A two stage and slow-drop clearing approach will be employed to minimise impacts on possible fauna in identified habitat trees; and
- Removal of vegetation will be targeted during late Summer and Autumn.

Resources

Prior to clearing, habitat features (stag trees, fallen logs and large flat rocks) suitable for salvage will be identified managed and recorded in accordance with Whitehaven's Rehabilitation Execution Protocol. The salvaged habitat features would be used throughout rehabilitation and offsets to create habitat to achieve the specific fauna outcomes that are outlined in the approved rehabilitation objectives and rehabilitation completion criteria in **Section 4**.

d. Rock/Overburden Emplacement

Overburden and interburden mined will continue to be used to in-fill the mine void behind the advancing open cut, as well as one out-of-pit mine waste rock emplacement areas.

The waste rock emplacements at WCC will be progressively shaped for rehabilitation activities, including final water management , topsoiling and revegetation.

e. Waste Management

Wastes produced at the WCCM comprise of:

- General domestic-type wastes from on-site buildings and routine maintenance consumables;
- Oils and grease; and
- Sewage.

Domestic-type wastes will be collected and disposed of by a licensed waste disposal contractor, with recyclable materials separated, where possible. Waste oils from maintenance activities are pumped from equipment to bunded storage tanks or removed from site by a service truck. Sewage is managed via onsite facilities serviced by licensed contractors.

Prior to decommissioning, Contaminated land Assessments will be undertaken to identify potential land contamination. If contamination is identified, consideration will be given to the remediation and management of contaminated soil onsite.

f. Geology and Geochemistry

Geologically, the mine is located in the Werris Basin which extends from the Namoi River near Carroll, southwards to where it extends beneath the Tertiary basalts of the Liverpool Ranges in the Willow Tree – Wallabadah area to Blandford. The Mooki Thrust forms the western boundary of the Werris Basin while Lower Carboniferous rocks known as the Currabubula Formation and comprising a bed of conglomerates over the top of a thin bed of tuffaceous limestones form the eastern boundary.

Several smaller basins and dome structures have been identified within the Werris Basin. The Colliery Basin, which incorporates the Werris Creek outlier of the Greta Coal Measures deposit targeted by the Mine, is an example of the coal-bearing rocks of Permian age that occur in the centre of the Werris Basin and is the target of coal to be mines as part of this proposal. The Greta Coal Measures which comprise pebble and granular conglomerates, sandstones, mudstones and coal originating in a fluvial to deltaic environment, occur as a small elongate basin-shaped outlier of the Willow Tree Formation.

An investigation of the physical and chemical characteristics of the overburden and interburden of the Werris Creek coal resource completed by URS (2004) concluded that there is a low potential for both acid formation and soluble salt generation from the overburden and interburden material. As such, there are no specific handling and emplacement requirements for these materials and no specific risks to rehabilitation as a consequence.

g. Material Prone to Spontaneous Combustion

Spontaneous Combustion on Coal Stockpiles

The risk of a spontaneous combustion event at WCCM is considered to be in the medium to high spontaneous combustion range.

Potential spontaneous combustion on coal stockpiles is also considered to be a high risk and is managed in accordance with the site safety management system. Key controls in managing spontaneous combustion include:

- Regular inspections of ROM coal stockpiles by site supervisors to check areas for evidence of combustion and general stockpile maintenance;
- The length of time coal is held in stockpiles is minimised;
- Coal stockpiles are watered as required to reduce heat; and
- Training for personnel and contractors working in proximity to the ROM coal stockpiles to be alert for, and respond to, indications of spontaneous combustion.

Spontaneous Combustion on Overburden Emplacement Areas

Although WCCM does not co-dispose rejects within the final landform and overburden does not have self-heating properties, the risk of spontaneous combustion within overburden emplacement areas requires ongoing management.

Heating within overburden emplacements areas is a risk to rehabilitation success and is managed by isolating the affected area through excavation, saturation and spreading.

To mitigate this risk during decommissioning and to ensure future heating of residual coal in the final landform is avoided, WCCM will remove carbonaceous materials for sale and if required, blend coal material with inert overburden before placement in the final landform.

Accumulation of residual coal placed in the final landform will be covered with three metres of inert overburden material.

h. Material Prone to Generating Acid Mine Drainage

An investigation into the physical and chemical characteristics of overburden and interburden of the WCCM coal resource completed by URS in 2004 concluded that there is a low potential for both acid formation and soluble salt generation. As such, there is no specific handling and emplacement requirements for these materials and no risks to rehabilitation.

i. Ore Beneficiation Waste Management (Reject and Tailings Disposal)

Coal is segregated at the ROM coal stockpile based on the expected ash content of the coal. The higher ash coal products are processed through the fixed plant crusher and subsequently processed through the secondary crusher. Low ash coal products are processed by the mobile crushers and then screened.

The despatch of product coal from WCC is either railed to the Port of Newcastle or transported by road to domestic customers.

j. Erosion and Sediment Control

Key sources of erosion and sedimentation are generally related to surface water runoff from exposed surfaces, including cleared areas, stockpiles (coal, soil and waste rock) and unsealed roads, and to a lesser degree caused by wind erosion from emplacement areas and stockpiles.

Erosion and sediment control (ESC) at WCC is managed in accordance with the WCC Site Water Management Plan (including an Erosion and Sediment Control Plan), relevant regulatory requirements and the relevant guideline documents.

k. Ongoing Management of Biological Resources for Use in Rehabilitation

Biological resources are managed during the active mining phase in accordance with WHC's Rehabilitation Execution Protocol.

Salvaging habitat materials including vegetation (particularly hollow trunks) and large rocks is outlined further in **Section 6.4**

l. Mine Subsidence

The WCCM is an open cut mine that intercepts the underground workings of the former Werris Creek Colliery. The former underground workings are mined through using open cut mining methods. Subsequently, mine subsidence is not applicable to WCCM.

m. Management of Potential Cultural and Heritage Issues

Aboriginal heritage is managed in accordance with the Heritage Management Plan which was developed in consultation with Registered Aboriginal Parties (RAPs) and OEH (now Heritage NSW).

Engagement with RAPs and Heritage will be undertaken as part of detailed mine closure planning. Advice will be sought as to the transfer of artefacts from the Aboriginal Keeping Place to the rehabilitated post mining landscape.

n. Exploration Activities

Exploration activities will be undertaken in accordance with the requirements of the Exploration Code of Practice: Rehabilitation. Disturbance from previous exploration activities will be rehabilitated prior to mine closure. All exploration drill holes will be sealed in accordance with relevant RR DRG guidelines at the time.

6.3.2 DECOMMISSIONING

The Decommissioning and Demolition Phase encompasses all works required to prepare land for rehabilitation including removal of any unnecessary built infrastructure, foundation and hardstand materials, services, equipment and materials including wastes and contamination.

Decommissioning, demolition, and removal of infrastructure from the mine site will generally be undertaken during the mine closure phase. Any infrastructure including dams, roads and buildings which is beneficial for future use by post mining landowners may be left in place subject to relevant landowner agreements and regulatory approvals.

Decommissioning and demolition activities will be appropriately planned and documented to ensure that appropriate approvals are in place for the works.

Further detail regarding demolition activities will be determined as the operation approaches closure. Detail in this regard will be reported in the Forward Program.

a. Site Security

Site security measures will be implemented during and following the decommissioning process to prevent access by members of the public and secure rehabilitation areas, including any heritage places or objects and any retained infrastructure items. Site security measures include:

- Site sign-in and induction processes;
- Security contractors will conduct regular patrols;
- Maintenance of existing security fences and signage; and
- Restricted offroad access to rehabilitated areas.

b. Infrastructure to be Removed or Demolished

Site features, services and structures to be decommissioned and demolished to achieve the final land use are described in **Table 21.**

Table 21 Infrastructure to be Decommissioned

Code	Mining Domain	Description
1	Infrastructure Area	Roads including haul and access roads, rail including rail load-out facility and rail loop, buildings including administration, workshop and amenities, processing including crusher/screener, dry separator and ancillary infrastructure, explosives magazine (three securely fenced facilities) and hydrocarbon storage (four 62 000L above ground tanks)
3	Water Management Area	Void water dams, sediment basins and associated drainage infrastructure, water storage dams and other pumping and pipework infrastructure.

4	Overburden Emplacement Area	Signage, pipelines, access Roads, storage Areas, and communication Facilities
5	Active Mining Area (Open cut void)	Signage, access roads and storage areas

All demolition work on site is carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures, or its latest version.

The Detailed Mine Closure Planning process conducted over the life of mine, in consultation with DPE, RR, LPSC and CCC will further identify key actions, assessments, studies, detailed designs, and regulatory approvals required to decommission and/or demolish built infrastructure.

c. Buildings, Structures and Fixed Plant to be Retained

Site features, services and structures to be retained for future use as part of the final land use are described in **Table 22.**

Table 22 Infrastructure to be Retained

Code	Mining Domain	Description
1	Infrastructure Area	Escott road, site access road and the “Eurunderee” homestead
3	Water Management Area	Clean water diversion drains around the overburden emplacement, sediment basins down-slope of previous areas of disturbance and clean water dams located to the south of the Site Access Road.
4	Overburden Emplacement Area	All infrastructure to be removed unless otherwise agreed following consultation completed as part of detailed mine closure planning
5	Active Mining (Open cut void)	All infrastructure to be removed unless otherwise agreed following consultation completed as part of detailed mine closure planning

The Detailed Mine Closure Planning process conducted over the life of mine, in consultation with DPE, RR, LPSC and CCC will:

- Determine and obtain the relevant approvals for decommissioning;
- Determine the structural integrity of the building/structure/infrastructure to be retained;
- Identify the associated short-term and long-term risks to public safety and the environment from the structures remaining in place, which should identify potential modes of failure;
- Address any potential residual risks such as potential for structures to fail; and
- Engage (where required) a suitably qualified engineer to verify that any risks have been satisfactorily addressed.

d. Management of Carbonaceous/Contaminated Material

Carbonaceous Material

During decommissioning, detailed inspections or audits will be undertaken within the footprint of surface infrastructure including stockpiles, access roads and haul roads to identify remaining sources of carbonaceous material. Following the inspections or audits carbonaceous material will be transported for sale or emplaced within the final landform.

Contaminated Material

Contamination assessments will be completed as part of the detailed mine closure planning and decommissioning processes:

- WCC will engage a suitably experienced and qualified person to conducted contamination and remediation assessments;
- Phase 1 and Phase 2 (where required) assessments will be undertaken for all features, services and structures within the Infrastructure Area domain;
- Subject to the findings and recommendations of the Phase 1 assessment, a targeted Phase 2 assessment will be completed; and
- If contamination is identified, a Remedial Action Plan will be developed, detailing remediation strategies for potential contamination.

Contaminated materials with be managed so that remedial works are completed prior to rehabilitation being completed within the relevant domains.

e. Hazardous Materials Management

During decommissioning, hazardous materials (hydrocarbons and chemicals) will be managed and stored in accordance with the site Waste Management Plan. Removal of hazardous materials will be undertaken by a licensed waste disposal contractor and disposed / recycled at a licensed waste facility.

f. Underground Infrastructure

The WCCM is an open cut mine that does not have any portals, decline entries, shafts, underground equipment, or subsidence monitoring lines. The underground workings of the former Werris Creek Colliery are intercepted by WCCM however, these are mined through using open cut mining methods.

Subsequently, underground infrastructure is not applicable to WCCM.

6.3.3 LANDFORM ESTABLISHMENT

Landform establishment is the process of shaping the final landform to a safe, stable and non-polluting landform that is appropriate for the desired final land use and consistent with the surrounding landscape. The final landform for the WCCM is shown on the Final Landform Plan in **Section 5**.

Water Management Infrastructure

Elements such as drainage paths, contour drains, ridgelines, and emplacements will be shaped, as much as practical, to undulating profiles in keeping with natural landforms of the surrounding environment. Water management structures are designed to collect surface runoff from rehabilitation or disturbed areas.

Sedimentation dams will be constructed and retained during rehabilitation to collect runoff from rehabilitated areas until discharge water quality meets regulatory criteria and dams can be decommissioned.

Water management structures that will remain following mine closure is detailed in **Figure 6.**

Final Landform Construction: General Requirements

The approved final landform is shown conceptually on Figure 1, Appendix 5 of PA 10_0059. The approved final landform includes a partially backfilled final void with a floor level of approximately 330 mAHD (i.e., approximate final void depth of 58 m below ground level [mbgl]), side slopes up to 18 degrees, and vegetated using native woodland species. Key features of the final landform also include:

- Final landform will be safe, stable and non-polluting;
- Final landforms will be free draining and sympathetic to natural landforms as far as practicable;
- Woodland ecological communities will be established on the gentler slopes and shrubby woodland communities on steeper slopes of the emplacement area;
- An Acoustic and Visual Amenity Bund;
- An area of Class III agricultural land; and
- Dump sequencing will be optimised to facilitate progressive shaping and rehabilitation.

Final Landform Construction: Reject Emplacement Areas and Tailings Dams

WCCM does not emplace reject within overburden or store rejects in tailings dams during operations and is Not Applicable to WCCM.

d. Final Landform Construction: Final Voids, Highwalls and Low Walls

Final Void

The principal objective of landform establishment activities associated with the final void is to create a safe and stable landform that is non-polluting. General construction characteristics of the safe and stable final void include:

A partially backfilled final void with its floor a minimum of 5 m above the predicted long term groundwater level (330 mAHD) with an approximate final void depth of 58 m below ground level [mbgl]), side slopes up to 18 degrees, and vegetated using native woodland species.

Slopes of the southern perimeter and floor to be less the 10 degrees with remaining slopes to be less than 18 degrees.

Infrastructure Area and Overburden Emplacement Area

General construction characteristics of the Infrastructure Area and Overburden Emplacement Area Domains include:

- The Waste Rock emplacement will be progressively constructed to an approx. height of 445 m AHD and side slopes of approximately 10 degrees or less;
- Slopes such as ramps left in situ may exceed 10 degrees but not exceed 18 degrees;
- The upper surface of the overburden emplacement will include micro-relief in the form of drainage swales and rises to allow water to drain. An average fall of 1% from a central location to the outer edges of the upper surfaces will be created;
- The upper surface of the overburden emplacement will only be visible from elevated vantage points surrounding the mine with reduce slope outer batters sympathetic with local topography and the most dominate visual feature;
- Materials suspected of being chemically unfavourable for rehabilitation will be buried a minimum of 2m below the final rehabilitation surface;
- Remaining surfaces of infrastructure areas will be profiled to match surrounding topography prior to revegetation; and
- The Acoustic and Visual Amenity Bund will be approximately 2.2 kilometres on length, with an outer slope of 10 degrees. It will range in height from 5 m to 25 metres.

Construction of creek/river diversion works

The WCC final landform does not include creek or diversion works. Subsequently, construction of creek/river diversion works is not applicable to WCC.

Temporary diversion infrastructure installed to divert clean water during mining will be removed, subject to the erosion and sediment control requirements.

6.3.4 GROWTH MEDIUM DEVELOPMENT

In the context of this RMP, growth medium development encompasses activities to reinstate soils with the initial physical, chemical and biological characteristics required to establish the desired vegetation community.

Characterisation

Sampling will determine if the topsoil and subsoil is suitable for rehabilitation use or if it requires amelioration or selective handling and placement. If the growth medium cannot be effectively ameliorated, unsuitable subsoil and spoil will be buried.

Capping spoil will be ameliorated if required, and contour ripped prior to the placement of the topsoil.

Topsoil Respreading and Amelioration

Prior to the re-spreading of stockpiled topsoil and subsoil, an assessment of weed infestation and amelioration will be undertaken. If unsuitable soil is identified, the stockpiled material will be buried. For all other stockpiled material, the following re-spreading measures will be adopted where appropriate:

- When planning soil re-spreading, sites will consider the information contained in the stockpile inventory (i.e., amount, age, type), climatic conditions, the location and distance of the stockpile from the area to be rehabilitated, the pre-mining vegetation communities (i.e., what communities were growing in the area prior to stripping), and the vegetation communities and final land use proposed for the rehabilitation area;
- Over handling of soil will be minimised to mitigate structural degradation of the soils;
- Material will be spread in even layers and will consider the soil depth information obtained through the pre-stripping soil sampling;
- All soils will be lightly ripped prior to seeding. This will be conducted on the contour and will be managed to minimise the potential for unsuitable spoil material being ripped up to the surface;
- Fertiliser application will be considered prior to seeding (agricultural rehabilitation only) while the surface is being lightly scarified to create an optimal seed bed; and
- Soil testing results will be used to determine if physical and/or chemical amelioration is required, and the rates and method of application. Where soil ameliorants are used, they should be applied to the stockpiles.

Where necessary soil will typically be ameliorated using one or more of the following:

- Mulching to increase organic carbon, and improve the soils water holding capacity and soil biota levels;
- Fertiliser (i.e., to increase nutrient levels) (restricted to agricultural soil rehabilitation areas, where possible, or as a slow-release formula applied directly beneath hand planted tree seedlings); and/or
- Gypsum (i.e., to treat dispersion, calcium to magnesium ratio, and improve structure and water holding capacity).

Seed Bed Preparation

Thorough seedbed preparation will be undertaken to ensure optimum establishment and growth of vegetation. All top-dressed areas will be contour ripped (after top-dressing) to create a “key” between the soil and the subsoil / capping prior to placement of materials.

For seedings areas ripping will be undertaken along the contour, where possible and preferably immediately prior to sowing. The spread top-dressed surface will be scarified with the contour immediately prior to seeding to reduce runoff and increase infiltration. Deep ripping lines every 20 m with the contour will occur in areas of poor water infiltration.

For tree planting / Hiko areas, deep ripping if required should be scheduled well ahead of the target planting date to allow for sufficient rip line settlement, to capture rain and improve soil moisture and ongoing moisture retention.

Final Land Use Domain B – Agricultural – Grazing

The northern section of the Project area will be revegetated with pasture species that would be suitable for sustainable and managed livestock grazing. These areas would be prepared with a total soil profile depth of approximately 200 mm overlaid on mine waste rock.

Topsoils intended for re-use in agricultural rehabilitation areas will be further assessed prior to stripping to determine their suitability for re-use and determine specific amelioration requirements. Once soils are spread, ameliorants such as gypsum will be applied and the area deep-ripped along the contour (as required).

Final Land Use Domain A – Native Ecosystem

The overburden emplacement area will be revegetated as woodland rehabilitation. Soil resources for native vegetation rehabilitation will generally be re-spread to 200 mm deep. Once soils are re-spread, ameliorants such as gypsum will be applied and the area deep-ripped along the contour to produce a friable soil surface that optimises water infiltration and soil – seed contact.

6.3.5 ECOSYSTEM AND LAND USE - ESTABLISHMENT

In the context of this RMP, ecosystem establishment includes activities to establish the desired floristic composition (species diversity and density) and habitat features. The phase incorporates management actions such as weed and feral pest control to achieve species establishment and growth to juvenile communities, and habitat augmentation.

Revegetation activities will be planned to occur after the completion of reshaping, topdressing with growth media and construction of drainage structures.

Final Land Use Domain B – Agricultural – Grazing

Agricultural land suitable for grazing will be re-established on the coal processing infrastructure areas and stockpile areas. Detailed management of Agricultural Rehabilitation Areas will be further developed in future revisions of this RMP.

Final Land Use Domain A – Native Ecosystem

Revegetation

Native vegetation areas have historically been rehabilitated with an initial cover of native ground cover grasses and then seeded and/or planted with woodland overstorey specific commensurate with the target vegetation communities. Native vegetation areas are now planted with and will continue to contain a seed mix that includes species across all canopy layers and a cover crop mix to provide initial stabilisation as native seed establishes. Species used in revegetation will consider a range of species such as grasses, herbs, forbs, low shrubs, mid-sized shrubs and trees. The indicative revegetation species composition is based on analogue species.

Weed and Vertebrate Pest Control

Ecosystem Establishment includes initial management actions to limit the introduction of weeds and vertebrate pest species in rehabilitation areas. Ongoing weed and pest management and monitoring is considered in the ecosystem and land use development phase (refer **Section 6.3.6**).

Management measures include:

- Treatment of weeds on topsoil stockpiles prior to re-spreading in rehabilitation areas;
- Ensuring all plant and equipment are weed free prior to mobilisation to rehabilitation areas;
- Maximising the retention of ground cover (cover crop stubble) when planting Hiko stock to minimise opportunities for weed activity; and

- Installation of fauna exclusion fencing and/or tree guards for newly planted tube stock where predation by grazing herbivores represents a risk to establishment.

6.3.6 ECOSYSTEM AND LAND USE DEVELOPMENT

For the purposes of this RMP the ecosystem and land use development phase represent those activities required to develop sustainable ecosystems that have characteristics comparable to similar undisturbed vegetation in the area.

All Domains

Activities associated with the ecosystem and land use development phase of rehabilitation are generally ongoing maintenance, land management activities and rehabilitation monitoring. Maintenance at rehabilitated areas will include, but not be limited to:

- Ongoing environmental management to minimise risks to rehabilitation;
- Comparing specific ecosystem characteristics such as soil profile development, floristic composition and structure, faunal diversity and abundance with the characteristics of appropriate analogue sites; and
- Undertaking adaptive management and remedial works where characteristics of the rehabilitation are not trending toward desired outcomes.

Rehabilitation monitoring will be undertaken throughout the ecosystem and land use development phase until it can be demonstrated that rehabilitation areas have met completion criteria and all conditions for relinquishment. Rehabilitation maintenance activities will be identified by rehabilitation monitoring and ongoing requirements will be reported annually in the Annual Rehabilitation Report and Forward Program.

6.3.7 REHABILITATION COMPLETION (SIGN OFF)

Rehabilitated areas will be progressively signed-off by the Resources Regulator as they meet the rehabilitation criteria outlined in **Section 4**, in accordance with the *Guideline: Achieving Rehabilitation Completion (Sign-off).*

6.4 REHABILITATION OF AREAS AFFECTED BY SUBSIDENCE

Mine subsidence is not applicable to WCCM, as all historic UG workings have been mined through.

7 REHABILITATION QUALITY ASSURANCE PROCESS

A Rehabilitation Quality Assurance Process (RQAP) will be implemented throughout the Rehabilitation process. This will include details of inspections, monitoring and record keeping which will be required to ensure that:

- Rehabilitation is being implemented in accordance with the nominated methodologies; and
- Identified risks to rehabilitation are being adequately addressed at each phase of rehabilitation.

Whitehaven will implement the RQAP through every phase of rehabilitation to confirm that the rehabilitation strategies outlined in this RMP have been completed in accordance with the nominated methodologies (See **Figure 10**). The RQAP will also include inspections and documentation to verify that each phase of demolition and rehabilitation has been completed and has met the completion criteria detailed in **Section 4**. Documentation to be maintained would include (but not limited to):

Phase 1 – Active Mining;

- Documentation of pre-clearance surveys and Clearing Checklists;
- Resource salvage records (soil, rocks, habitat trees);
- Dumping plans and surveys; and
- Detailed Landform designs.

Phase 2 – Decommissioning;

- Documentation of boreholes sealing and sign off by RR;
- Inspection and demolition reports to confirm all infrastructure to be demolished has been removed;
- Documentation to identify the future landowner responsible for the ongoing upkeep and management of retained infrastructure; and
- Validation testing to ensure any contamination has been appropriately remediated and/or removed.

Phase 3 – Landform Establishment;

- Survey and preparation of as constructed drawings of final constructed slopes, landforms and water drainage structures; and
- Verification reporting to confirm the specified depth of capping has been implemented (i.e., aerial surveys).

Phase 4 – Growth Medium Development;

- Maintenance of a topsoil inventory to document stripped, stockpiled and re-spread resources;
- Site records of re-spread topsoil, ameliorants, fertiliser etc.; and
- Soil testing results to confirm appropriate soil geochemical parameters for plant establishment.

Phase 5 – Ecosystem and Land Use Establishment;

- Documentation of reseeding or planting activities undertaken, such as date of planting, weather conditions, seeding rates and/or planting rates; and

- Site inspections and monitoring of rehabilitated areas to allow early identification of any emerging threats to rehabilitation.

Phase 6 – Ecosystem and Land Use Development.

- Inspections of temporary and permanent erosion and sediment controls;
- Inspections to identify potential weed infestations;
- Documentation of Rehabilitation Monitoring; and
- Documentation of weed and feral animal management and eradication programs and follow-up inspections.

Whitehaven have developed a Rehabilitation Quality Checklist to be signed off after each phase of rehabilitation prior to proceeding to the next phase (refer **Figure 10)**.

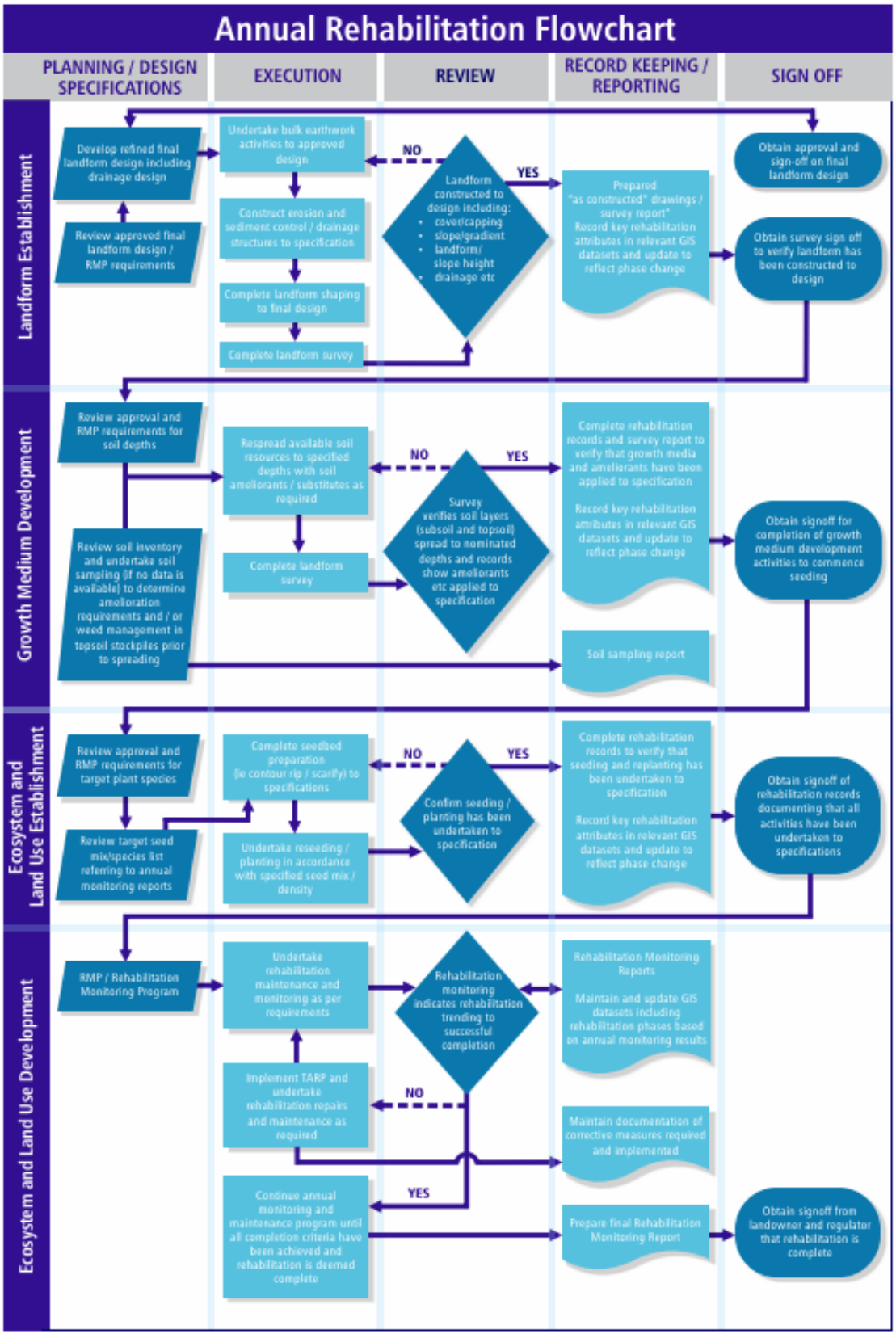

Figure 10 Rehabilitation Quality Assurance Process

8 REHABILITATION MONITORING PROGRAM

Rehabilitation monitoring is undertaken at WCC to measure and assess rehabilitation performance against the stated rehabilitation and closure criteria outlined in this document. The monitoring results are also used to identify the need for corrective actions for rehabilitation performance. The monitoring program incorporates the most appropriate indicators and methods that:

- Provide a measure of completion criteria to be assessed in accordance with the defined rehabilitation objectives;
- Adequately track changes to rehabilitation phases;
- Are reproducible;
- Utilise scientific recognised techniques; and
- Are cost-effective.

Monitoring is conducted by a suitably skilled and qualified person(s) at locations representative of the range of conditions on the rehabilitating areas and appropriate analogue sites. Monitoring results will inform refinements of rehabilitation methodology as required. Rehabilitation monitoring will be continued until it can be demonstrated that rehabilitation has satisfied all rehabilitation and closure criteria.

8.1 ANALOGUE SITE BASELINE MONITORING

Analogue sites in ‘best-on-offer’ vegetation are used to determine if the appropriate characteristics are developing or being achieved. For benchmarking purposes, there are replicate sites within each vegetation community target, and repeat monitoring to capture seasonal variation. Protocols have been established to ensure that sites are appropriately located and position, as detailed in the Whitehaven Standard Annual Rehabilitation Monitoring Methodology (WHC-STD-OC-Rehabilitation Monitoring Method).

Annual Rehabilitation monitoring is undertaken in accordance with Section 8.2. Each year additional permanent sites are established in rehabilitation that has been seeded since the previous monitoring event. Annual Rehabilitation Monitoring of the newly established sites will identify any emerging risks to rehabilitation failing to achieve final landform.

Annual Rehabilitation monitoring results will link with the TARP management system in Section 10 if issues are identified during the monitoring period.

The data yielded from the monitoring program allows an adaptive management approach by providing information to inform the type and implementation of management activities and determining the status of rehabilitation performance in relation to completion criteria. This facilitates the continual improvement and refinement of rehabilitation techniques.

8.2 MEASURING PERFORMANCE AGAINST REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

8.2.1 ANNUAL REHABILITATION WALK OVER INSPECTION

Annual walk-through of all rehabilitated areas is undertaken internally by a suitably qualified person(s) to assess the general progress of completed rehabilitation and to identify areas where corrective action is necessary. This assessment has simple objectives relating to vegetation establishment, weeds, erosion presence, surface water management and erosion and sediment control structures.

The walk-through assessment identifies any problems such as:

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

Any issue identified during the walk over will be recorded and the *Annual Site Rehabilitation Plan* which is updated to include remediation or monitoring activities on the issues.

8.2.2 ANNUAL REHABILITATION MONITORING

Annual Rehabilitation Monitoring is undertaken during spring each year when species are generally flowering, and more species diversity can be identified in rehabilitation areas. Annual rehabilitation monitoring is undertaken in accordance with the RMM.

The monitoring provides detailed (transect-based) scientific data and trends on vegetation community establishment and development and is based on the Biodiversity Assessment Methodology (BAM).

Additional monitoring sites are established as rehabilitation progresses. Periodic or standalone monitoring projects are commissioned as required, and may include targeted fauna, soil, and trial studies.

Detailed analysis of the monitoring data generated by the annual rehabilitation monitoring program is undertaken to determine the trajectory rehabilitation is tracking towards to achieve the final land uses detailed above. The analysis and monitoring outcomes are documented in annual monitoring reports.

Regular visual inspections of all phases of rehabilitation are also undertaken. These informal assessments facilitate early management intervention, and include:

- Success of initial germination after seeding;
- Success of tree and shrub plantings;
- Adequacy of drainage controls;
- Presence/absence of weeds; and
- General stability of the rehabilitation site.

Any issue identified during rehabilitation inspection and documented in the annual rehabilitation monitoring report is actioned in the *Annual Site Rehabilitation Plan*.

8.2.3 REHABILITATION PERFORMANCE

Outcomes of monitoring results as described in **Section 8.2.1** to **Section 8.2.2** are incorporated within the *Annual Site Rehabilitation Plan* which is developed every year by the end of June to align with the budget period. The *Annual Site Rehabilitation Plan* provides additional specific detail, maps and statistics on planned rehabilitation activities and schedules for the next 12-month period. Notwithstanding this, planned activities are consistent with those in the Forward Program/LOM Plans. The *Annual Site Rehabilitation Plan* will provision for rehabilitation activities depending on the phase of rehabilitation at a particular area. The *Annual Site Rehabilitation Plan* will be the key document for tracking the progress of rehabilitation through rehabilitation phases.

9 REHABILITATION RESEARCH, MODELLING AND TRIALS

9.1 CURRENT REHABILITATION RESEARCH, MODELLING AND TRIALS

Werris creek currently has no rehabilitation trail is progress. Rehabilitation monitoring and rehabilitation methodology records are shared among Whitehaven operations to inform decision-making regarding rehabilitation campaigns.

9.2 FUTURE REHABILITATION RESEARCH, MODELLING AND TRIALS

The results of future research and rehabilitation trials will be reported upon within each Annual Review and Annual Rehabilitation Program.

10 INTERVENTION AND ADAPTIVE MANAGEMENT

Where rehabilitation performance is not trending toward the nominated completion criteria this may indicate that there is a potential threat to long term rehabilitation success. Threats to rehabilitation may include events such as extended periods of drought, bushfire events, or pressures from weeds and feral/pest animals.

A Rehabilitation and Closure Trigger Action Response Plan (TARP) has been developed to provide a framework to manage potential key risks to rehabilitation. The Rehabilitation and Closure TARP includes:

Identification of the principal contributing factors and impacts for each major risk to rehabilitation;

Identification of upper limits (trigger values) for causes and impacts that are considered to represent an unacceptable level of risk; and

Identification of appropriate responses to mitigate or remediate the causes and impacts, including a notification protocol.

The Rehabilitation and Closure TARP provides management responses for lower (first tier) and upper (second tier) trigger values. First tier trigger values identify opportunities for closer monitoring or early intervention that may mitigate potential impacts before notable impact to rehabilitation occurs. Second tier trigger values identify when indicators have reached a threshold that requires more substantive or widespread remedial actions to remediate or mitigate rehabilitation failure.

Should any trigger conditions be met resulting in the requirement for intervention or adaptive management, actions will be reported in the Annual Rehabilitation Report. Whitehaven will notify the Resource Regulator and other relevant stakeholders of any incident (such as bushfire or disease) that results in major impacts to rehabilitation that are likely to significantly impact the potential to achieve rehabilitation success.

The Rehabilitation and Closure TARP is provided in **Table 23,** and will be revised as conditions at WCCM change or new risks to rehabilitation are identified.

Table 23 Trigger Action Response Plan

Aspect/ Category	Key Element	Element Number	Trigger Response	1st Level Trigger	2nd Level Trigger
Landform stability	Slope gradient	1	Trigger	Monthly survey data indicates that the landform is not built to the final landform design.	<55% of the rehabilitation area has slopeswithin the limits stipulated in the final the RMP.
			Response	Check machinery guidance system on dozers and update if required Check site datum and update if required. Undertake regrading as required	Undertake a review of the landform design and make an assessment of the stability of the landform including material characterisation. Undertake stability enhancement works including revegetation if required. Consider regrading to achieve stability.
	Erosion control	2	Trigger	Minor gully or tunnel erosion present and/or minor rilling (rilling up to 200 mm in depth or width).	Slumping and / or active gully or tunnel erosion present and / or rilling >200mm, which is compromising landform stability.
			Response	An inspection of the site will be undertaken by a suitably trained person. Investigate opportunities to install water management infrastructure to address erosion. Remediate as appropriate.	Engage suitably qualified person(s) to assist with the management of erosion andsedimentation at the site and provide recommendations to appropriately remediate the erosion. Remediate as soonas practicable.
	Water management Structures	3	Trigger	Water management structures (sediment dams, channels, contour banks) minor erosion and/or scouring as determined by monitoring.	Water management structures fail or display significant scouring / erosion as determined by monitoring.
			Response	An inspection of the site will be undertakenby a suitably trained person. Identify remedial actions such as amelioration, re- vegetation or alternative scour protection	Engage a suitably qualified person to develop a site-specific remediation plan and review water management structure design criteria. Provide for physical works on the basis of design review.
Soil/spoil Quality	Salinity	4	Trigger	Increasing trend in soil/water salinity levels	Presence of salt scalds
			Response	Undertake soil/spoil testing to verify EC and recommend further soil / spoil amelioration	Engage a specialist consultant suitably qualified person to develop a site-specific management report to be implemented to remediate salinity scalds. Undertake worksas required.
	Spoil surface layers chemical characteristics	5	Trigger	Increasing trend in soil dispersity (EAT)	Soils are moderately to highly dispersive
			Response	Undertake testing to determine required amelioration and undertake ameliorationas required.	Review material handling practices to confirm that non-dispersive spoil is selectively dumped at final RL where possible and /or dispersive spoils emplaced at surface are appropriately ameliorated. Ameliorate dispersive spoils (for examplewith coarse gypsum) to a depth of 300 mm.

					Re-vegetate if required.
	Soil biophysical and chemical characteristics	6	Trigger	Soil biophysical and chemical characteristics not able to sustain vegetation growth for required vegetation community	Soil physical, chemical and biological characteristics continues to illustrate signs of not able to sustain the desired final land use.
			Response	Engage a consultant to recommend appropriate soil/spoil amelioration. Undertake amelioration and re-vegetation in accordance with the consultant recommendations.	Engage a consultant to recommend appropriate soil/spoil amelioration. Undertake amelioration and re-vegetation in accordance with the consultant recommendations.
	Topsoil depth	7	Trigger	Topsoil is not reinstated to, at least, the minimum depth specified for the proposed final land use. As identified in the quality assurance process	Sufficient suitable topsoil cannot be identified for reinstatement at the minimum specified depth for the proposed final land use i.e.,150mm to 200mm (agriculture areas), 200 mm (other disturbance areas).
			Response	Spread additional topsoil to achieve required depth	Engage a consultant to recommend appropriate soil/spoil amelioration. Undertake amelioration and re-vegetation in accordance with the consultant recommendations.
Biodiversity (native vegetation areas)	Native Species Richness	8	Trigger	Less than 50% of species sown recorded.	Less than 25% of species sown recorded.
			Response	Undertake a field survey to identify which species are not present in revegetation areas. Re-seed or maintenance planting of revegetation areas with unsatisfactory species richness. Review viability results and modify seed species as required	Undertake a field survey to identify which species that are not present in revegetation areas. Engage an independent specialist to review seed viability and others causes for revegetation failure and recommend remedial actions. Implement appropriate management actions including revising rehabilitation procedures if required.
	Native Groundcover	9	Trigger	Less than 50% of groundcover species sown recorded.	Less than 25% of groundcover species sown recorded.
			Response	Undertake a field survey to identify likely causes of unsatisfactory germination rates. Re-seed areas with unsatisfactory cover. Review seeding procedures incl. seasonal mixes, timing and seed rate per hectare.	Undertake a field survey to identify which species that are not present in revegetation areas. Engage an independent specialist to review seed viability and others causes for revegetation failure and recommend remedial actions.

					Implement appropriate management actions including revising rehabilitation procedures if required.
	Exotic Plant Cover (Weeds)	10	Trigger	Increasing number and cover of exotic species and/or occurrence of newly identified exotic species.	More than 20% of domain area and/or significant weed invasions.
			Response	Engage weed management contractor to remove / spray introduced weed species.	Engage weed management contractor toremove introduced weed species. Investigate management measures to improve native plant establishment and weed suppression. Implement recommendations as appropriate.
Water Quality	Water quality	11	Trigger	Water quality exceeds baseline values	Long term trend outside ANZECC qualityguideline limits values
			Response	Review and investigation of water quality monitoring and management where appropriate. Implement relevant remedial measures where required.	Specialist to review sampling and climate data and review likely cause(s). If mine related, undertake assessment to identify sources of water quality degradation and recommend remedial actions Implement specialist recommendations
	Discharge water qualityat licence discharge points	12	Trigger	Sediment basin discharge exceeds EPL criteria for pH, TSS and/or oil/grease	Long term trend outside ANZECC quality guideline limits
			Response	Re-sampling will be undertaken during the next discharge event to confirm results exceed limits and investigate potential causes.	Review sediment basin maintenance and discharge procedures, and sediment basincapacity requirements. Undertake requiredcorrective actions.
			Response	Undertake a review of the landform design to assess risks to stability and free draining design.	Engage a specialist to assist with the management of settlement and slumping and provide recommendations to appropriately remediate. Consider rehandling material and/or regrading if required.
	Monitoring of final landform	14	Trigger	Survey or remote sensing of the rehabilitated landforms indicates settlement or slumping that could compromise stability.	Survey or remote sensing of the rehabilitated landforms indicates major settlement or slumping.
			Response	Undertake a review of the landform design to assess risks to stability and free draining design.	Engage a specialist to assist with the management of settlement and slumping and provide recommendations to appropriately remediate. Consider rehandling material and/or regrading if required.

11 REVIEW, REVISION AND IMPLEMENTATION

11.1 REVIEW AND REVISION OF THE PLAN

The Plan will be reviewed and if required revised in the event of the following:

An amendment to the rehabilitation objectives, completion criteria or proposed final land use;

Changes to risks, risk control measures or rehabilitation strategies being identified during the completion of rehabilitation risk assessment or additional investigations;

When directed to by the RR Secretary; and

When triggered by consent conditions (Annual Reviews, Independent Environmental Audits, Incident Reports, Modifications.

11.2 IMPLEMENTATION

The process for ensuring that mining and rehabilitation are conducted in accordance with the RMP is the preparation and implementation of an Annual Rehabilitation Plan. The Annual Rehabilitation Plan is prepared and managed by the Rehabilitation and Closed Mine Manager and approved by the Mine Manager.

ACCOUNTABILITIES

Role	Accountability
General Manager	Ensure adequate resources are available to the Operations Manager to complete required rehabilitation activities according to the forward plan; Ensure adequate resources are available to enable the Environment Manager/Supt to complete the required monitoring and quality control activities in this plan.
Operations Manager	Complete rehabilitation activities according to the schedule put forward in the Forward Plan. Ensure adequate resources are made available to monitor and assure the quality during the rehabilitation process.
Environmental Mgr/Supt	Monitor the progress of the rehabilitation completed against completion criteria and objectives. Monitor and report on any risks to rehabilitation success and communicate those risks effectively. Provide advice to the Operations Manager on all rehabilitation matters.
All Workers	Complete any rehabilitation activities according to procedures and protocols. Advise the Environmental Supt or delegate of any issues or risks encountered during rehabilitation activities.

SUPPORTING DOCUMENTATION

The following supporting documentation which includes associated training materials may need to be consulted and, where appropriate, used when applying this Standard and/or any subordinate procedures:

- *WHC-PRO-GOC-Annual Rehabilitation Planning Process*

Revisions	Revision Description	Who Consulted	Date
1	Document Developed	Environmental Manager, Ops Mgr, Env Supt, Env Officer	28/7/22
2			

APPENDIX A – LAND OWNERSHIP

Ownership	Lot Number	Deposited Plan Number
WHC	19, 20, 65, 73-75, 83, 90, 92, 109, 110, 112, 120, 121, 123, 126-130, 131-135, 217, 225	751017
WHC	1-4	1022826
WHC	1-4	1037145
WHC	2	431951
WHC	1	186633
WHC	270	257307
WHC	2	1095262
WHC	1	344178
WHC	1	1114226
WHC	1	328762
WHC	1	328763
WHC	11-12	1160636

APPENDIX B – STANDARD MINING LEASE CONDITIONS

Refer to website: https://legislation.nsw.gov.au/view/pdf/asmade/sl-2021-360