ROCGLEN COAL MINE

CLOSURE MINING OPERATIONS PLAN

(31 MARCH 2019 - 30 MARCH 2022)

March 2019

Rocglen Coal Mine	
Closure Mining Operations Plan (MOP)	
Name of Mine	Rocglen Coal Mine
Closure MOP Commencement Date	31 March 2019
Closure MOP Completion Date	30 March 2022
Mining Authorisations (Lease/Licence No.)	Mining Lease (ML) 1620 and 1662
Name of Authorisation /Authorisation holder(s)	Whitehaven Coal Mining Limited
Name of Mine Operator	Whitehaven Coal Mining Limited
Name and Contact Details of the Mine Manager (or equivalent)	Craig Sullivan Phone: 02 6741 9325 Email: CSullivan@whitehavencoal.com.au
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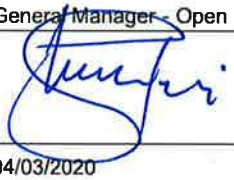
Name of Representative(s) of the Authorisation Holder(s)	Jacques du Toit
Title	General Manager - Open Cut Operations
Signature	
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1 INTRODUCTION

1.1 HISTORY OF OPERATIONS

The Rocglen Coal Mine (previously known as Belmont Coal Project) was originally granted PA 06_0198 on 15 April 2008 under Part 3A (now repealed) of the *EP&A Act*. ML 1620 was subsequently issued for the Rocglen operation in June 2008 and coal production commenced in late 2008.

In summary, approximately 1.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal is approved to be mined within the open cut pit using truck and excavator method. The coal is transported approximately 30 kilometres by road to the Whitehaven Coal Handling and Preparation Plant (CHPP) for selective washing and subsequent transport by rail to the Port of Newcastle or by road to domestic customers.

On 27 May 2010, an approval was issued under Section 75W of Part 3A of the EP&A Act to modify PA 06_0198 (PA 06_0198 MOD 1). This modification permitted Whitehaven to undertake unplanned emergency earthworks to stabilise the eastern highwall following slipping adjacent to a fault structure in the north eastern portion of the approved open cut pit. It was determined that stabilisation works were required to ensure the long-term stability and safety of the highwall, which would in-turn enable on-going extraction efforts at the northern end of the approved open cut.

Following further drilling and definition of the local geological features, as well as additional reviews of the mine plan, Whitehaven proposed to expand operations at Rocglen in order to maximise resource recovery and allow for improved mine progression.

Whitehaven received PA 10_0015 on 27 September 2011 under Part 3A of the EP&A Act for the Rocglen Coal Mine Extension Project. ML 1662 was issued on 9 January 2012 to cover the Rocglen Coal Mine Extension Project, specifically the water management and overburden emplacement activities proposed to occur outside the bounds of ML 1620.

Approval was issued for a modification to PA 10_0015 (MOD 1) on 10 November 2014 relating to coal haulage. Two further modifications to PA 10_0015 were granted on the 24th August 2015 and the 10th February 2017, and related to receipt of coal rejects and coal haulage respectively.

1.2 SCOPE OF THIS CLOSURE MOP

This Closure MOP has been prepared by Whitehaven in accordance with the requirements of ML 1620/1662 and Schedule 3, Condition 36 of PA 10_0015 (as modified) being the requirement for a Rehabilitation Management Plan (see Section 1.5 for more details).

This Closure MOP has been prepared in consideration of:

- *ESG3: Mining Operations Plan Guidelines, September 2013* (NSW Department of Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy [DTIRIS-DRE], 2013) (the MOP Guidelines).
- Contemporary examples of approved Closure MOPs.
- *Whitehaven Coal Manual – Closure Planning* (Whitehaven, 2018a).
- *Whitehaven Coal Environmental Standard – Closure* (Whitehaven, 2018b).
- *Strategic Framework for Mine Closure* (Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia, 2000).
- *Leading Practice Sustainable Development Program for the Mining Industry - Mine Closure* (Commonwealth of Australia, 2016).

This Closure MOP covers the period between 31 March 2019 and 30 March 2026 (herein referred to as the Closure MOP term).

At this stage, coal extraction at the Rocglen Coal Mine is proposed to cease in approximately July 2019. Following cessation of mining, supplementary earthworks (including out-of-pit overburden rehandling into the open cut, and bulk soil placement and shaping) are expected to continue until approximately May 2021. Between June 2021 and March 2026, activities at the Rocglen Coal Mine will be focused around ongoing rehabilitation (including some minor soil earthworks). Appendix C includes an indicative timeline and asset register of rehabilitation and decommissioning activities to be undertaken during the Closure MOP term.

By the end of the Closure MOP term, it is not expected that any areas of the Rocglen Coal Mine will be relinquished.

1.3 HISTORY OF ROCGLEN COAL MINE MOPS

Table 1 lists the previous MOPs for the Rocglen Coal Mine.

Table 1
Rocglen Coal Mine MOP History

Document Title	Status	Approved	Expiry
Rocglen Coal Mine MOP – November 2015 to October 2020	Current	30 October 2015	31 March 2019
Rocglen Extension MOP (as amended)	Superseded	21 October 2011	30 October 2015
Rocglen MOP (as amended)	Superseded	12 June 2008	1 October 2012

1.4 CURRENT CONSENTS, AUTHORISATIONS AND LICENCES

The Rocglen Coal Mine is a State Significant Development (SSD) in accordance with Clause 8 and Schedule 1 (Item 5) of NSW *State Environmental Planning Policy (State and Regional Development) 2011*, therefore it is considered to be a Level 1 Mine as specified in the MOP Guidelines.

The Rocglen Coal Mine's consents, authorisations and licenses are listed in Table 2. The Mining Lease and Project Approval areas are shown on the Closure MOP Plans (Appendix A).

Table 2
Rocglen Coal Mine Consents, Authorisations and Licences

Regulatory Authority	Instrument	Date of Issue	Expiry Date	Comments
NSW Department of Industry, Skills and Regional Development – Division of Resources and Energy	ML 1620	10 Jun 2008	9 Jun 2029	Issued for the original Rocglen Coal Mine Project.
	ML 1662	9 Jan 2012	9 Jan 2033	Issued for the Rocglen Coal Mine Extension Project.

Regulatory Authority	Instrument	Date of Issue	Expiry Date	Comments
NSW Department of Planning and Environment	PA 10_0015	27 Sep 2011	31 Dec 2022	PA issued for Rocglen Coal Mine Extension Project (the original PA was surrendered). Approval term is until 31 December 2022.
NSW Department of Planning and Environment	PA 10_0015 (MOD 1)	10 November 2014	31 Dec 2022	MOD 1 issued for to allow for a modification to coal haulage.
NSW Department of Planning and Environment	PA 10_0015 (MOD 2)	24 August 2015	31 Dec 2022	MOD 2 issued to allow for changes to receipt of reject.
NSW Department of Planning and Environment	PA 10_0015 (MOD 3)	10 February 2017	31 Dec 2022	MOD 3 issued to allow for a modification to coal haulage.
NSW Department of Planning and Environment	PA 10_0015 (MOD 4)	01 November 2018	31 Dec 2022	MOD 4 issued to allow for a modification to coal haulage.
NSW Environment Protection Authority	EPL 12870	31 Jul 2008	-	Includes two licensed surface water discharge points.
Commonwealth Department of the Environment	Environment Protection and Biodiversity Conservation Act Approval (EPBC 2010/5502)	21 Dec 2011	16 Nov 2025	Approval related to listed threatened species and communities and listed migratory species.
Department of Primary Industries – Water (DPI Water)	Water Licences WAL 29461 WAL 36758 90BL254855 90BL254856 90BL254857 90BL254858 90BL254859 90BL110883 90BL104367 90BL102845	Various	-	Groundwater monitoring bores.

1.5 MOP/REHABILITATION MANAGEMENT PLAN REQUIREMENTS

Table 3 summarises the relevant conditions of PA 10_0015 (as modified) and ML 1620/1662 with regard to the preparation of the Closure MOP, and shows where each condition has been addressed within this document.

Detailed objectives and regulatory requirements relating to rehabilitation and post-mining land use are outlined in Section 4.

Table 3
MOP/Rehabilitation Management Plan Requirements

Condition	Requirement	Section Addressed
PA 10_0015 Schedule 3 Condition 36	The Proponent shall prepare and implement a Rehabilitation Management Plan for the site to the satisfaction of DRE. This plan must:	
	a) be prepared in consultation with the Department, DPI Water, OEH Council and the CCC;	Sections 1.7 and 13
	b) be submitted to DRE by the end of 2012;	Section 1.2
	c) be prepared in accordance with any relevant DRE guideline;	
	d) describe the measures that would be implemented to ensure compliance with the relevant conditions of this approval;	Section 4.1 This Closure MOP
	e) address all aspects of rehabilitation including mine closure, final landform, and final land use; and	
	f) build to the maximum extent practicable on the other management plans required under this approval.	Section 1.2
ML 1620/1662 Condition 3	Mining Operations Plan (MOP) a) Mining operations must not be carried out otherwise than in accordance with: a Mining Operations Plan (MOP) which has been approved by the Director-General of the Department of Primary Industries.	This Closure MOP
	b) The MOP must: i) identify areas that will be disturbed by mining operations;	Section 2.3
	ii) detail the staging of specific mining operations;	Section 2.3
	iii) identify how the mine will be managed to allow mine closure;	Sections 5,7,8 and 9
	iv) identify how mining operations will be carried out on site in order to prevent and or minimise harm to the environment;	Section 3
	v) reflect the conditions of approval under: - the Environmental Planning and Assessment Act 1979; - the Protection of the Environment Operations Act 1997; - and any other approvals relevant to the development including the conditions of this lease; and	Sections 1.4 and 4.1
	vi) have regard to any relevant guidelines adopted by the Director-General.	Section 1.4
	c) The titleholder may apply to the Director-General to amend an approved MOP at any time.	Noted
	d) It is not a breach of this condition if: i) the operations constituting the breach were necessary to comply with a lawful order or direction given under the Mining Act 1992, the Environmental Planning and Assessment Act 1979, Protection of the Environment Operations Act 1997 or the Occupational Health and Safety Act 2000; and ii) the Director-General had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.	Noted
	e) A MOP ceases to have affect 7 years after date of approval or other such period as identified by the Director-General. An approved amendment to the MOP under condition 5 does not constitute an approval for the purpose of this paragraph unless otherwise identified by the Director General.	Noted

OEH = NSW Office of Environment and Heritage.
DPI Water = NSW Department of Primary Industries – Water (now DI Water).

1.6 CURRENT LAND OWNERSHIP AND LAND USE

The Rocglen Project Approval Area (see Plan 1) covers an area of approximately 460 hectares within the Parish of Tulcumba, County of Nandewar and Local Government Area of Gunnedah. It incorporates all or part of the following land parcels:

- Lot 1 in DP 787417;
- Part Lot 1 in DP 1120601;
- Lot 4 in DP 1120601; and
- Public roads and road reserves.

The schedule of Lands attached to PA 10_0015 is reproduced in Table 4.

Table 4

Schedule of Lands

Area	Land Title Reference	Land Ownership
Mining Lease	Lots 1 and 4 in DP 1120601. Lot 1 in DP 787417.	Freehold (Whitehaven).

Land ownership within and surrounding Rocglen is shown on **Plan 1**. As evident, Whitehaven currently owns all freehold land within ML 1620/1662 as well as the surrounding properties identified as “Glenroc”, “Costa Vale”, “Yarrawonga”, “Yarrari”, “Belah”, “Brentry”, “Stratford” and that part of the “Roseberry” property contained within the bounds of Rocglen. The remaining surrounding properties are privately owned.

The Vickery State Forest adjoining Rocglen to the west is owned by the Crown. The remaining land within and surrounding Rocglen occurs as public road reserves.

Rocglen is located in an area that is relatively isolated from other mining or extractive industry operations. At the time of preparing this MOP, the nearest operational mine is Whitehaven’s Tarrawonga Coal Mine at approximately 15 kilometres north-west of Rocglen. Other mines within the vicinity are either closed and rehabilitated (former Vickery Mine), are currently undergoing final rehabilitation (former Canyon Coal Mine) or are yet to commence (approved Vickery Coal Project).

1.6.1 Land Use

The majority of ML 1620/1662 is utilised for open cut coal mining and mining-related activities permitted under PA 10_0015 and has been disturbed by historic land clearing, long-term agricultural production and/or coal mining. Successive years of such disturbance have limited the presence of remnant vegetation to relatively small scattered areas, isolated stands and individual trees.

The Vickery State Forest adjoins Rocglen to the west and is declared under the *Brigalow and Nandewar Community Conservation Area Act 2005* to be within Community Conservation Area (CCA) Zone 4 Vickery. Approximately 3.5 kilometres to the east of Rocglen is the CCA Zone 2 Kelvin. In accordance with the *Brigalow and Nandewar Community Conservation Area Act 2005* this land, which was formally known as the Kelvin State Forest, is reserved under the *National Parks and Wildlife Act 1974* as Aboriginal area.

The Whitehaven Regional BioBank Site provides for the long-term conservation of approximately 1,500 hectares of land owned by Whitehaven to the east of Rocglen. This area of land has been registered as a BioBank Site under Part 7A of the *Threatened Species Conservation Act 1995* (TSC Act). It is being actively managed via a *BioBanking Management Plan* with in-perpetuity management funding, and has

the highest level of conservation status outside of National Parks via a *BioBanking Agreement* registered on the land title in-perpetuity.

The remaining land area within the vicinity of Rocglen is characterised by traditional agricultural production comprising a combination of livestock grazing and crop cultivation.

Proposed Land Use

Section 4.2 of this MOP outlines the proposed final land use for the site. The post-mining landform has been developed and refined in order to ensure that a low maintenance, stable and safe landform remains that blends in with the surrounding topography and can support a mixture of rehabilitated woodland with areas of pasture.

1.7 STAKEHOLDER CONSULTATION

Extensive stakeholder consultation was undertaken throughout all stages of the Rocglen Coal Mine Extension Project assessment and approval process. Rocglen engaged with the local communities and stakeholder groups to consult regarding issues addressed in this MOP including final land use options and rehabilitation expectations.

Key issues associated with final land use and rehabilitation addressed in the Rocglen Coal Mine Extension Project EA consultation process included:

- The configuration options for the final landform and final void;
- Development of a rehabilitation strategy for the site including the post mining land use and the post mining landforms for the project;
- The proposed methods of rehabilitation, land uses and final landforms in relation to current land uses and landforms;
- Impacts of clearing, access and rehabilitation on the current and proposed long−term land uses;
- Reject disposal and the methods for rehabilitation and long term land uses; and
- Justification of the final landform.

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_0015 conditions. Consultation was also undertaken for the Rocglen Coal Mine Extension Project EA modifications.

A Community Consultative Committee (CCC) was established and meetings are convened in accordance with the requirements of PA 10_0015 (Schedule 5 Condition 5). Meeting minutes are available on the Whitehaven website.

Progress of rehabilitation and closure activities are reported annually in *Annual Reviews* which are available on the Whitehaven website.

1.7.1 Proposed Future Consultation

The approved Closure MOP will be presented to OEH, Gunnedah Shire Council and the Rocglen CCC during the 2020 reporting period.

Consultation will continue with stakeholders during the MOP term as required and in accordance with the Stakeholder Engagement Plan.

1.7.2 DPIE-RR Feedback on Closure MOP

This document was originally submitted to the Resource Regulator (RR) for approval on 22nd February 2019 to allow for approval prior to the expiry of the current Rocglen MOP Amendment A, October 2020.

On 5th February 2020, RR issued a *Request for Additional Information* providing an adequacy assessment of the MOP and requiring Whitehaven to submit a revised MOP by 5th March 2020. This revised version of the MOP has been prepared to address comments provided by the RR including Action table 5 from the Aspect Ecology Rehabilitation Report 2019 now included in Section 4 Table 9.

A copy of the correspondence letter received from RR is included in **Appendix D.** Including a table that details the response to each RR request.

2 PROPOSED MINING AND CLOSURE ACTIVITIES

2.1 PROJECT DESCRIPTION

Activities proposed during the Closure MOP term include:

- Coal extraction until approximately July 2019.
- Processing and rehandling of coal.
- Supplementary earthwork activities until approximately May 2021, including:
  - handling of all carbonaceous material into the open cut and capping with at least 3 metres (m) of inert material;
  - rehandling of overburden material from the western out-of-pit waste emplacement and backfilling of the open cut to create a reduced final depression; and
  - bulk soil earthworks including placing and shaping of subsoil and topsoil to allow rehabilitation.
- Ongoing rehabilitation and minor soil earthworks (e.g. regrading of topsoil cover).
- Decommissioning of relevant infrastructure.

Appendix C provides an indicative timeline and asset register of these activities.

2.2 ASSET REGISTER

Primary domains have been defined in accordance with the requirements of the MOP Guidelines and represent the set of discrete areas that have a particular operational or functional purpose. All areas previously disturbed by mining, or proposed to be subject to the activities described in the sections below, have been assigned to an appropriate primary domain. The relevant primary domains at the Rocglen Coal Mine are defined in Section 5.1.

The asset register (Table 5) provides a summary of the key features of each primary domain at Closure MOP commencement. The areas for each primary domain represent the footprint for each domain depicted on Plan 2, provided in Appendix A.

Table 5
Asset Register

Domain	Area (ha)	Major Assets
Domain 1: Infrastructure	19.4	Infrastructure areas, buildings, sealed access road and haul route to the Coocooboonah Lane intersection at the ML boundary, unsealed access roads, hardstand, helipad, amenity bund, maintenance areas.
Domain 3: Water management areas	27.5	Sediment dams, clean water storage dams, pipelines and pumps
Domain 4: Overburden emplacement areas	116.5	Overburden emplacements.
Domain 5: Stockpiled material	23.3	Stockpiled soil.
Domain 6: Void (Open cut void)	21.7	Void footprint.
Domain 7: Rehabilitation areas	163.5	Footprint of existing rehabilitation areas.
Domain 8: Undisturbed areas	89.3	Footprint of undisturbed areas within the mining lease.

ha = hectare.

2.3 ACTIVITIES OVER THE CLOSURE MOP TERM

2.3.1 Exploration

No exploration activities are expected to be undertaken during the Closure MOP term.

2.3.2 Construction

No construction activities are expected to be undertaken during the Closure MOP term.

2.3.3 Mining Operations Associated with Coal Extraction

Plan 3A shows the intended progression of open cut mine development from the beginning of the Closure MOP term to when coal extraction is expected to cease (approximately July 2019).

ROM coal is transported from the Rocglen Coal Mine by trucks along public roads on the approved coal haulage route to the Whitehaven CHPP.

2.3.4 Overburden Emplacement and Supplementary Earthworks

Production wastes comprise overburden (including interburden) from the development of the open cut.

The Rocglen Coal Mine involves the transport and emplacement of this overburden material into out-of-pit and in-pit emplacement areas during coal extraction. Plans 3A, 3B and 3C show the location of these emplacement areas.

Following cessation of coal extraction, overburden material from the out-of-pit emplacement would be rehandled and used to partially backfill the open cut. Supplementary earthworks would involve bulk soil activities (e.g. placing and shaping of subsoil and topsoil from stockpiles to the final depression) to allow for rehabilitation.

As part of the supplementary earthworks, all carbonaceous material (including from the infrastructure area) would be transferred into the open cut and capped with at least 3 m of inert overburden, subsoil and topsoil.

Overburden emplacement and supplementary earthworks are expected to cease by approximately May 2021.

2.3.5 Processing Residues and Tailings

No processing residues or tailings will be produced during the Closure MOP term.

Reject material from the Whitehaven CHPP will be returned via truck to nearby Whitehaven pits including Rocglen for disposal. All reject material will be co-disposed in the pit void with waste rock material as described in section 3.2.4.

2.3.6 Material Production Schedule

The material production schedule for the duration of the Closure MOP period is listed in Table 6.

Table 6
Material Production Schedule during the Closure MOP Term

Material	Unit	(1 Apr 2019 – 31 Mar 2020)	(1 Apr 2020 – 31 Mar 2021)	(1 Apr 2021 – 31 Mar 2022)	(1 Apr 2022 – 31 Mar 2026)
Stripped soil	m^3	0	0	0	0
Overburden	Mbcm	1.2	1.2	1.2	0
ROM Coal	Mt	0.25	0	0	0
Coarse/Fine Reject	Mt	0	0	0	0
Product Coal	Mt	0	0	0	0

Mbcm = Million bulk cubic metres.

2.3.7 Waste Management

Wastes produced at the Rocglen Coal Mine 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.

2.3.8 Temporary Stabilisation

No temporary stabilisation is proposed during the Closure MOP term, however may be utilised if required.

2.3.9 Progressive Rehabilitation and Completion

Progressive rehabilitation would continue to be undertaken at the Rocglen Coal Mine including topsoil and subsoil placement and shaping, and revegetation. Further details of rehabilitation activities to be undertaken during the Closure MOP term are provided in Section 7. An indicative timeline of rehabilitation is provided in Appendix C. Relinquishment of decommissioned rehabilitated areas is discussed in Section 7.4.

2.3.10 Decommissioning and Demolition Activities

Decommissioning of onsite infrastructure and water management dams would occur during the Closure MOP period. Further details of decommissioning activities to be undertaken during the Closure MOP term are provided in Section 7. An indicative timeline of decommissioning activities is provided in Appendix C. Relinquishment of decommissioned rehabilitated areas is discussed in Section 7.4.

3 ENVIRONMENTAL ISSUES MANAGEMENT

3.1 ENVIRONMENTAL RISK ASSESSMENT

The Whitehaven Risk Register (Appendix B) was used to calculate the consequence and likelihood of an event at the Rocglen Coal Mine during the Closure MOP term, to evaluate the subsequent risk level (risk rank). Risks are ranked as Low, Moderate, High or Critical. This system operates in accordance with AS/NZS ISO 31000/2009.

The Risk Register identifies eleven risks to rehabilitation during the Closure MOP term, four ranked as moderate risk, and the remaining seven ranked as low risk.

3.2 ENVIRONMENTAL RISK MANAGEMENT

Operations at the Rocglen Coal Mine are undertaken in accordance with an Environmental Management Strategy (EMS). The following management plans are required by PA 10_0015:

- *Environmental Management Strategy;*
- *Heritage Management Plan;*
- *Blast Management Plan* (incorporating a *Blast Monitoring Program*)*;*
- *Noise Management Plan* (incorporating a *Noise Monitoring Program*);
- *Road Traffic Noise Management Plan;*
- *Road Closure Management Plan;*
- *Water Management Plan;*
- *Air Quality and Greenhouse Gas Management Plan;*
- *Whitehaven Regional Biodiversity Offset Management Plan; and*
- *Rehabilitation Management Plan (incorporated into Mining Operations Plan).*

The current versions of the management plans are available on the Whitehaven website.

During the Closure MOP term, it is expected that a number of these management plans will become redundant or require revisions to reflect the cessation of coal extraction and supplementary earthworks (e.g. the Blast Management Plan and Noise Management Plan). Revision and removal of these plans would be undertaken in consultation with the relevant regulatory agencies.

The following sub-sections provide a description of the measures that will be used for rehabilitation-related aspects identified, including associated aspects, in the Risk Register requiring specific management.

3.2.1 Surface Water

Surface water at Rocglen will continue to be managed in accordance with the approved *Water Management Plan.* The surface water management measures that will be implemented during the MOP term are summarised below:-

- All efforts will be undertaken to ensure that any water discharged from Rocglen via the licenced discharge points (LDPs) meets the quality limits imposed on the site's EPL.
- Dirty water generated from disturbed areas will be captured and diverted using contour banks, drains and rock lined structures in a manner that minimises the potential for concentrated overland flow and subsequent erosion. This water will be channelled through a series of sediment basins to reduce sediment loads prior to discharge.

- Water generated within the open cut pit, primarily as a result of rainfall/runoff and some groundwater seepage, will be managed within the open cut via in-pit sumps. This water will be directed to and contained within these in-pit sumps until it is necessary to pump the water to the Mine Water Dam (constructed as a 'turkeys nest' to receive mine water only).
- Clean water diversions will be used wherever possible upstream of disturbance areas to minimise the amount of dirty water to be contained and treated within the dirty water management system.
- Progressive rehabilitation of all re-shaped surfaces will be undertaken to assist in reducing the total suspended solids (and possible high pH and salinity) in runoff from disturbed areas. This will also reduce the dependence on sediment controls and generally assist in improving water quality.
- Water collected in the open cut extraction pit and/or dirty water dams will be used, as much as possible, for dust suppression purposes.
- Sediment control structures will be maintained to ensure the design capacities are preserved for optimum settling rates. This will be most critical for those 'end-of-line' sediment basins that discharge from Rocglen.
- Drainage lines impacted upon by the mining operation will be rehabilitated post-mining generally in accordance with Section 5.3.3 of *Managing Urban Stormwater Volume 1: Soils and Construction* (Landcom 2004) and the *Guidelines for Controlled Activities – In-Stream Works* (DWE 2008) for watercourse rehabilitation and riparian zone rehabilitation.
- Controlled discharge of treated water (settled and/or flocculated) will be undertaken to draw down the water storage within all the dirty water dams on-site, which will provide the capacity to contain the majority of rainfall events and reduce uncontrolled overflow discharge.

On the basis of the above, surface water was ranked as a low risk to rehabilitation and closure.

3.2.2 Groundwater

Groundwater at Rocglen will continue to be managed in accordance with the approved *Water Management Plan*. The groundwater management measures that will be implemented during the MOP term are summarised below.

General

- All hydrocarbon products will be securely stored.
- With the exception of some maintenance activities on mobile equipment, all maintenance works requiring the use of oils, greases and lubricants would be undertaken within designated areas of Rocglen.
- All water from wash-down areas and workshops would be directed to oil/water separators and containment systems.
- All storage tanks will be either self-bunded tanks or bunded with an impermeable surface with a capacity to contain a minimum of 110 percent of the largest storage tank capacity.

On the basis of the above, groundwater was ranked as a low risk to rehabilitation and closure.

3.2.3 Erosion and Sedimentation

Final landform drainage structures including contour banks, drains and rock lined structures have been, or will be, designed and constructed on rehabilitated landforms to manage run-off from rehabilitation areas at sub-erosive velocities.

All runoff from rehabilitation areas is to be directed to sediment basins and storage dams prior to discharge from site until runoff reaches suitable water quality (Section 3.2.1). Erosion is assessed as a component of the rehabilitation monitoring and inspection program and any significant erosion features are remediated as required.

Temporary erosion and sediment controls would be installed prior to topsoil respreading.

On the basis of the above, erosion and sedimentation was ranked as a low risk to rehabilitation and closure.

3.2.4 Acid Mine Drainage

Prior to mine commencement, representative samples of overburden materials were analysed by the Australian Laboratory Services (ALS) and each sample exhibited a negative Net Acid Producing Potential (NAPP). This indicates that the materials would not be a source of acid leachate generation when exposed. On this basis, acid mine drainage is not considered a potential risk during the MOP term.

The following reject emplacement methodology will be employed to limit sulphide oxidation and acid generation and/or the migration of any acid or sulphate species that may be generated from migrating beyond the pit shell:

- The acid forming potential of reject will be minimised through the dilution effect of co-disposal with overburden (including ongoing cover of overburden as part of the operational overburden emplacement process).
- Reject will be placed inside the pit shell footprint.
- A setback angle of 30° will be utilised for 'supercharged' co-disposed rejects and overburden material (i.e. for areas where the backfill is higher than the original topography).
- The final cover of 3m of NAF material over PAF material will be emplaced within a maximum of 1 month, given normal operating conditions, from the time of co-disposal in the final lift of the waste emplacement. The 3m cover will sufficiently reduce oxygen diffusion and/or water infiltration and provides sufficient thickness for a base for the growth medium, which will overlie the cover.
- In line with MOP commitments, growth medium will be provided above the cover for rehabilitation to support successful long-term revegetation.

Operational checks and controls to be implemented to ensure compliance with this methodology would include:

- Water quality monitoring (various parameters monitored at six sites; LDP 11 [Conductivity, Oil and Grease], Mine Water Dam [Aluminium, Arsenic, Bicarbonate, Chloride, Conductivity, Iron, Manganese, Oil and Grease, Sodium, Total Organic Carbon, Total Suspended Solids, pH] and at LDP 12, Driggle Draggle Creek, Un-named drainage channel and Dam SD7 Total Organic Carbon, Total Suspended Solids and pH is monitored;
- Survey controls (to identify where reject material has to be placed and to confirm appropriate placement of rejects material);
- Annual, and as required i.e. mining of stratigraphy not covered by previous investigations, geochemical test work; and

Sampling and testing of cover material will be undertaken prior to placement of the material on the final landform. Sampling will be undertaken on a material type e.g. partings, interburden, overburden, basis. Samples will be tested for pH $_{(1:2)}$, EC $_{(1:2)}$, Total S (%S), MPA/ANC and NAPP (kg H_2SO_4/t).

On the basis of the above, acid mine drainage was ranked as a moderate risk to rehabilitation and closure.

3.2.5 Spontaneous Combustion

The coal at Rocglen has a low percentage of inorganic sulphur and hence a low potential for exothermic oxidation reactions. The short residence time of ROM coal stockpiles at the mine also minimises the potential for spontaneous combustion incidents.

The risk of spontaneous combustion of reject is inherently lower than for coal and is further minimised through the dilution and dispersion effect of overburden co-disposal. Testing completed on the Whitehaven CHPP rejects confirmed this with results showing a low propensity for spontaneous combustion, as follows:

- Relative Ignition Temperature of 165 to 170 degrees C
- Adiabatic Self Heating Test R70 of 0.192 degrees C/hour

Protocols for overburden and rejects emplacement include:

- Selectively handling partings, interleaves and other carbonaceous waste rock for in-pit emplacement within the pit boundary and at least 3m below the final landform design to ensure sufficient cover with inert material.
- Co-disposal of reject within the footprint of the pit shell with waste material.
- Reject represents a small percentage (approximately 2.5%) of overall material disposed of within the pit shell footprint.
- Co-disposal of reject in discrete areas within the overburden emplacement, reducing potential for large volumes of reject material and therefore, combustion potential.
- The combustion potential is minimised by the minimum 3m of cover material in the final landform which is considered to be sufficient to reduce exposure to lightning strikes and reduces oxygen dispersion which would be required to sustain combustion.
- Annual sampling and analysis of representative source reject material from the CHPP will be undertaken to assess for spontaneous combustion potential.

General management of spontaneous combustion will continue through the Closure MOP term and will consist of:

- earthworks to ensure that no coal seams remain exposed in the final landform highwall or endwall (i.e. due to partial backfilling of the open cut);
- selective handling of carbonaceous material;
- minimising the length of time coal is held in stockpiles;
- routine shift inspections of coal stockpiles and emplacement areas for signs of spontaneous combustion;
- reporting spontaneous combustion incidents; and
- training in spontaneous combustion management.

On the basis of the above spontaneous combustion was ranked as a low risk to rehabilitation and closure.

3.2.6 Geotechnical Stability and Slope Management

Material removed from the western waste emplacement would be used to partially backfill the open cut, which would result in a reduced final depression.

Rehabilitated slopes would be verified by survey to be generally 10 degrees for out-of-pit emplacements, and 14 degrees for the final depression.

To ensure the ongoing stability of slopes retained in the final landform, geotechnical assessment and survey of all key areas will be undertaken during the MOP term to assess the stability of the landform and to verify that it has been constructed in accordance with the final landform shown in Plan 4.

On the basis of the above geotechnical stability and slope management was ranked as a moderate risk to rehabilitation and closure.

3.2.7 Soil Type(s) and Suitability

Table 7 presents an inventory of the overall available soil volumes for rehabilitation and closure of the Rocglen Coal Mine. The location of soil stockpiles is presented in the MOP series 3Plans.

Table 7
Inventory of Soil Volumes (stockpiled and spread to date)

Soil	Quantities (m^3)		
	At the start of the Closure MOP	Estimate required to achieve final landform (Plan 4)[1]	At the end of the Closure MOP
Cumulative topsoil volume stripped	484,559	469,747	14,812
Cumulative subsoil volume stripped	514,764	436,610	78,154
Cumulative soil volume used for rehabilitation purposes	0	N/A	906,357
Cumulative soil stockpile volume	999,323		92,966

[1] some water management infrastructure areas will be rehabilitated post this Closure MOP period.

An assessment of placed topsoil quality was undertaken at Rocglen Coal Mine and concluded that:-

"The quality of the topsoil was in general accordance with the topsoil criteria of the MOP, although there were some locations that exceeded the pH values and salinity values. It is unclear if these elevated parameters are an inherent property of the soil from where it was sourced, or if it is due to being mixed with the underlying soil materials….The elevated electrical conductivity values are not considered a concern and are non-limiting to plant growth; however the elevated pH values warrant consideration."

Sections 7 and 9 describe the proposed standard rehabilitation, and intervention and adaption, management approaches with respect to soil quantity and quality.

Ongoing soil stockpile management measures include:

- Implementation of a weed control program in the event that unacceptable weed generation is observed; and
- avoiding the operation of machinery on the soil stockpiles to prevent compaction and maintain soil aggregation.

Topsoil and subsoil will be respread following establishment of the final landform. Topsoil will be respread to a nominal depth of 100-150 millimetres (mm) and subsoil to a depth of 100-150 millimetres

(mm). When the soil is re-spread it will be ripped along the contour to prevent soil erosion and seeded with the desired rehabilitation vegetation species.

On the basis of the above, soil type(s) and suitability was ranked as a moderate risk to rehabilitation and closure.

3.2.8 Flora and Fauna

The management measures that will be implemented during the MOP term to minimise the risk of impact to threatened flora and fauna, including threatened species habitat and ecological communities, are summarised below.

General

- All efforts will be made to avoid disturbance of the vegetation communities within Rocglen and to maintain and enhance as much of the existing remnant vegetation on-site as possible.
- The minimal practicable amount of clearing will be undertaken as a general objective, particularly within those areas that currently contain identified threatened species or ecological communities.
- Weed control practices will be implemented to minimise the spread of exotic species.
- A tree felling protocol will be implemented in order to minimise harm to fauna species during clearing activities.
- Where possible, tree felling will be supervised by a suitably qualified and experienced ecologist.
- Where trees are to be removed an assessment of the surrounding level of tree hollow provision will be undertaken by a suitably qualified and experienced ecologist in order to determine the need for local supplementing of tree hollows (using salvaged tree hollows or nest boxes).
- Mature and hollow-bearing trees will be retained wherever feasible within the site.
- Vegetation to be removed will be clearly marked in the field using temporary fencing (flagging tape or similar) so that the boundaries are clearly established and to minimise the potential for equipment to accidently enter areas to be retained.
- Regular monitoring of the vegetation within Rocglen will be undertaken in order to enable effective management with regards to rehabilitation (planting), regeneration, watering, fencing and weed control.
- Specialist ecologists will be engaged to conduct pre-clearing inspections for fauna impact mitigation, as required.

On the basis of the above, flora and fauna were respectively ranked as a moderate and low risk to rehabilitation and closure.

3.2.9 Weed Management

Under the NSW *Biosecurity Act, 2015,* Whitehaven has a statutory responsibility to prevent the spread of priority weeds on all Whitehaven-owned land on and surrounding the Rocglen Coal Mine. Weed species presence and abundance is assessed in the rehabilitation monitoring program on both rehabilitation areas and analogue sites.

Weed management practices to be adopted during the Closure MOP term include:

- ongoing visual assessments and weed monitoring as part of the rehabilitation monitoring program;
- application of herbicides where required to control weed infestations;
- recording and controlling any occurrences of priority weeds;
- restriction of grazing and vehicular traffic to minimise spread of weeds; and

- liaison with the North West Local Land Services (LLS).

Following closure of the Rocglen Coal Mine, it is expected that ongoing weed management requirements would be generally consistent with the requirements at surrounding agricultural properties.

3.2.10 Pest Animal Control

Feral animals have not been a significant issue over the life of the mine and are not considered to present a significant risk to rehabilitation. Controls in place to minimise the impact and potential for feral animal infestation include:

- ongoing visual observations of feral animal activity including camera monitoring and inspections for all the nominated vertebrate pests will be conducted in conjunction with the biodiversity and post-mining rehabilitation monitoring program; and
- liaison with North West LLS, and participation with the existing Whitehaven Biodiversity pest control programs as required by observation/monitoring. Pest control actions may include 1080 poison baiting for the declared Rabbits and Wild Dogs as well as other nuisance species such as European Red Foxes and Feral Pigs.

Following closure of the Rocglen Coal Mine, it is expected that ongoing pest management requirements would be generally consistent with the requirements at surrounding agricultural properties.

3.2.11 Bushfire

Fire prevention will continue to be undertaken and liaison with the Rural Fire Service (RFS) undertaken.

Following closure of the Rocglen Coal Mine, it is expected that ongoing bushfire management requirements would be generally consistent with the requirements at surrounding agricultural properties.

On the basis of the above, bushfire was ranked as a low risk to rehabilitation and closure.

3.2.12 Contaminated Land

A contaminated land assessment will be undertaken for any infrastructure areas decommissioned during the Closure MOP term (including ROM coal handling and stockpiling facilities, workshops, fuel storage and chemical storage facilities).

Any potential contamination will be remediated accordingly (see Section 7.2.1 for further details).

On the basis of the above, contaminated land was ranked as a low risk to rehabilitation and closure.

3.2.13 Mine Subsidence

The Rocglen Coal Mine is located in an area where no historic underground mining has been undertaken. Subsequently, no specific management controls or monitoring programs are considered necessary.

3.2.14 Public Safety and Controlling Access

Actions to be undertaken to prevent unauthorised access to the Rocglen Coal Mine include:

- signage at the entries to the Rocglen Coal Mine indicating that authorised personnel only are permitted on-site;

- the entry points to the Rocglen Coal Mine have gates which are locked when the mine is not in operation;
- signage on boundary fencing indicating that the Rocglen Coal Mine is an active mine (when the mine is in operation) and indicating that unauthorised access is not permitted;
- all persons are required to sign in at the site office;
- inductions for all persons; and
- visitors and personnel not inducted are required to be accompanied by an inducted person.

Public safety measures following closure of the Rocglen Coal Mine would be developed during the Closure MOP term in consultation with relevant stakeholders. Notwithstanding, the Rocglen Coal Mine final landform (including its proposed future land uses) has been designed to be safe, stable and non-polluting. It is expected that relevant signage, fencing and bunding for safety would be retained, subject to consultation with future landowner(s) and stakeholders.

3.2.15 Visual

Ongoing rehabilitation of the out-of-pit emplacements (which has already progressed significantly at the beginning of the Closure MOP period) would continue to improve visual amenity of the Rocglen Coal Mine over time.

Strategically placed woodland tree lots will be integrated into the post-mining landform to break-up the landform and provide visual texture.

A vegetated earthen bund of appropriate height will be maintained between the realigned Wean Road and the active pit area to provide an effective visual screen from Wean Road. In addition, a strip of woodland will be maintained in the post-mining landform to screen the view of the final void and generally improve the visual amenity from Wean Road.

4 POST-MINING LAND USE

4.1 REGULATORY REQUIREMENTS

The regulatory and approval requirements relating to post-mining land use, rehabilitation and closure are summarised in Table 8.

Table 8
Regulatory Requirements Relating to Post-Mining Land Use, Rehabilitation and Closure

Condition	Requirement	Status
ML 1620/1662		
2	The proponent shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation or rehabilitation of the development.	In progress.
7	Disturbed land must be rehabilitated to a sustainable/agreed end land use to the satisfaction of the Director-General.	In progress.
18	Operations must be carried out in a manner that does not cause or aggravate air pollution, water pollution (including sedimentation) or soil contamination or erosion, condition unless otherwise authorised by a relevant approval, and in accordance with an accepted MOP. For the purpose of this condition, water shall be taken to include any watercourse, waterbody or groundwaters. The lease holder must observe and perform any instructions given by the Director-General in this regard.	In progress.
22	Access tracks must be kept to a minimum and be positioned so that they do not cause any unnecessary damage to the land. Temporary access tracks must be ripped, topsoiled and revegetated as soon as possible after they are no longer required for mining operations. The design and construction of access tracks must be in accordance with specifications fixed by the Department of Environment and Climate Change.	In progress.
24 (ML1662)	The lease holder must make every reasonable attempt, and be able to demonstrate their attempts, to enter into a cooperation agreement with the holder(s) of any overlapping petroleum title(s). The cooperation agreement should address but not be limited to issues such as: access arrangements; operational interaction procedures; dispute resolution; information exchange; well location; timing of drilling; potential resource extraction conflicts; and rehabilitation issues.	N/A.
Schedule 2 Condition 1	The Proponent shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	In progress.

<table>
<tr><td>Schedule 2 Condition 5</td><td>The Proponent may carry out mining operations on the site until the end of December 2022.
Note: Under this Approval, the Proponent is required to rehabilitate the site and carry out additional undertakings to the satisfaction of both the Secretary and DRE. Consequently this approval will continue to apply in all other respects - other than the right to conduct mining operations - until the site has been rehabilitated and these additional undertakings have been carried out satisfactorily.</td><td>In progress.</td></tr>
<tr><td>Schedule 2 Condition 10</td><td>The Proponent shall ensure that all demolition work is carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures, or its latest version.</td><td>To commence at decommissioning.</td></tr>
<tr><td>Schedule 3 Condition 31(a)</td><td>The Proponent shall:-:-
implement all reasonable and feasible measures to minimise the visual and off-site lighting impacts of the project</td><td>In progress.</td></tr>
<tr><td>Schedule 3 Condition 34</td><td>The Applicant must rehabilitate the site to the satisfaction of the Resource Regulator. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA (and depicted conceptually in Figure 1 in Appendix 5), and comply with the objectives in Table 8.
Table 8: Rehabilitation Objectives
<table>
<tr><th>Feature</th><th>Objective</th></tr>
<tr><td>Mine site (as a whole)</td><td>Safe, stable and non-polluting</td></tr>
<tr><td>Final void</td><td>Minimise the size and depth of the final void as far as is reasonable and feasible; and
The final void is to be safe, stable and non-polluting</td></tr>
<tr><td>Surface infrastructure</td><td>To be decommissioned and removed, unless the Secretary agrees otherwise</td></tr>
<tr><td>Other land affected by the project</td><td>Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of:
local native plant species;
at least 206 hectares of woodland (see Figure 1 in Appendix 5); and
a landform consistent with the surrounding environment</td></tr>
<tr><td>Community</td><td>Minimise the adverse socio-economic effects associated with mine closure</td></tr>
</table></td><td>In progress.</td></tr>
<tr><td>Schedule 3 Condition 36</td><td>The Proponent shall prepare and implement a Rehabilitation Management Plan to the satisfaction of DRE.</td><td>In progress.</td></tr>
<tr><td>PA10_0015 Appendix 7 Statement of Commitments</td><td>Soil Stripping, Stockpiling and Re-Spreading
(h) A soil inventory will be maintained to ensure adequate material is available for planned rehabilitation activities.</td><td>In progress.</td></tr>
<tr><td>PA10_0015 Appendix 7 Statement of Commitments</td><td>Soil Stripping, Stockpiling and Re-Spreading
(j) Whitehaven will adopt the general practice, where appropriate subsoil is available and targeting areas being rehabilitated to pasture, of including an intermediate layer of subsoil between the overburden material and the topdressing to improve the water holding capacity of the rehabilitated landform and reinstate a more natural soil profile. For areas being rehabilitated to woodland, Whitehaven may preferentially reduce the subsoil replacement depth and/or exclude subsoil replacement in selected areas to establish trial areas to monitor woodland development in different soil profiles.</td><td>In progress.</td></tr>
<tr><td>PA10_0015 Appendix 7 Statement of Commitments</td><td>Soil Stripping, Stockpiling and Re-Spreading
(k) Where resources allow, topsoil and subsoil will each be spread to a nominal depth of between 100 to 150 mm, giving a combined depth of soil material on the rehabilitated landform of between 200 and 300 mm.</td><td>In progress.</td></tr>
<tr><td>PA10_0015 Appendix 7 Statement of Commitments</td><td>Progressive Rehabilitation
(a) Whitehaven will adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, where practicable, completed mining and overburden emplacement areas are quickly shaped, top dressed and vegetated to provide a stable landform. Early reshaping and</td><td>In progress.</td></tr>
</table>

	revegetation of the external batter slopes of the emplacement areas is particularly important and will be targeted as a priority.	
PA10_0015 Appendix 7 Statement of Commitments	**Progressive Rehabilitation** (b) Disturbed areas will generally undergo rehabilitation within one year of overburden emplacement and reshaping.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Drainage and Surface Water Structure Installation** (g) Surface water management structures will be progressively installed on the rehabilitated landform. The heights (effective depths) and cross-sectional areas of the individual banks will be determined on the basis of individual sub-catchment areas, but will typically be less than 0.7 metres and 3 square metres (m^2), respectively. Rock-lined drains will be used, where required, to convey water safely from the rehabilitated landform into the surface water management system that takes water from the site.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Revegetation** (h) The top dressed surfaces of those areas designated to be restored to rehabilitated pasture will be sown with a mixture of pasture species appropriate for the season. The seed mixture will include fast growing, short-lived species and perennial grasses and legumes.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Revegetation** (i) The top dressed surfaces of those areas designated to be restored as rehabilitated woodland will be initially stabilised with a non-persistent cover crop followed by planting of a selection of locally occurring tree and shrub species that will encourage the re-establishment of the pre-mining vegetation communities and, in the medium to longer term, create habitat and corridors for native fauna.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Revegetation** (j) All areas identified for woodland and pasture re-establishment will be fenced and have stock excluded until it can be demonstrated that the vegetation is stable and self-sustaining, and that grazing will not impact upon its establishment.	ML 1620/1662 fenced. In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Rehabilitation Monitoring and Maintenance** (k) Areas being rehabilitated will be regularly inspected and assessed against the long and short-term rehabilitation objectives. During regular inspections, aspects of rehabilitation to be monitored will include: - Evidence of any erosion or sedimentation from areas with establishing vegetation cover; - Success of initial grass cover establishment; - Success of tree and shrub plantings; - Adequacy of drainage controls; - Presence/absence of weeds; and General stability of the rehabilitation site.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Rehabilitation Monitoring and Maintenance** (l) Where the rehabilitation success appears limited, maintenance activities will be initiated. These may include re-seeding and where necessary, re-topdressing and/or the application of specialized treatments such as composted mulch to areas with poor vegetation establishment. Tree guards will be placed around planted tube stock if grazing by native animals is found to be excessive.	Noted and in progress.
PA10_0015 Appendix 7 Statement of Commitments	**Rehabilitation Monitoring and Maintenance** (m) If drainage controls are found to be inadequate for their intended purpose or compromised by grazing stock or wildlife, these will be repaired and/or temporary fences installed to exclude animals. Should areas of excessive erosion and sedimentation be identified, remedial works such as importation of additional fill, soil material and/or the redesigning of water management structures to address erosion will be undertaken.	Noted and in progress.
PA10_0015 Appendix 7 Statement of Commitments	**Rehabilitation Monitoring and Maintenance** (n) Monitoring will be conducted periodically by independent, suitably skilled and qualified persons at locations that are representative of the range of conditions on the rehabilitating areas. Annual reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness.	In progress.

PA10_0015 Appendix 7 Statement of Commitments	**Conceptual Post-Mining Land Use** (o) The disturbed area within the Project Site will be restored to either rehabilitated woodland or rehabilitated pasture, with approximately 5 hectares (1 percent) remaining as a stabilised highwall of the final void.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Conceptual Post-Mining Land Use** (p) Along the eastern boundary of the Project Site, adjacent to the realigned Wean Road, a strip of rehabilitated woodland will be established to screen the view of the final void and generally improve the visual amenity from Wean Road, as well as provide vegetation connectivity north-south on the eastern side of the void.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Conceptual Post-Mining Land Use** (q) In addition to the large area to be rehabilitated to woodland, strategically placed tree lots will be established within rehabilitated pasture areas to break-up the landform and act as wildlife refuges and linkages.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Conceptual Post-Mining Land Use** (r) Tree trunks and branches less than 300 mm diameter and other smaller vegetative debris removed during clearing activities will be spread over those areas to be restored as rehabilitated woodland where practical.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Final Void Management** (s) The final void will be designed and managed as a stable landform. Appropriate long-term land use options for the void will be considered and adequately assessed in consultation with relevant stakeholders as the mine approaches closure.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Vegetation Clearing and Soil Stripping** (c) Cleared trees and branches will be retained for use in stabilising slopes identified for restoration of rehabilitated woodland. No burning of vegetation is permitted or occurs on-site.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Vegetation Clearing and Soil Stripping** (v) As per the commitments listed in Section 8.6, Whitehaven will adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, where practicable, completed mining and overburden emplacement areas are quickly shaped, top dressed and vegetated to provide a stable landform.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Drainage Lines** (s) Sections of drainage lines that are or will be impacted upon by the mining operation will be rehabilitated post-mining generally in accordance with Section 5.3.3 of the Blue Book (Volume 1) and the Guidelines for Controlled Activities – In-Stream Works (DWE 2008, as cited in GSSE 2010) for watercourse rehabilitation and riparian zone rehabilitation.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Flora and Fauna** (o) Regular monitoring of the vegetation within the Project Site and offset areas will be undertaken in order to enable effective management with regards to rehabilitation (planting), regeneration, watering, fencing and weed control.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Visual Amenity** (b) As per the commitments listed above in Section 8.6, Whitehaven will adopt a progressive approach to the rehabilitation of disturbed areas within the Project Site to ensure that, where practicable, completed mining and overburden emplacement areas are quickly shaped, topdressed and vegetated. Early reshaping and revegetation of the external batter slopes of the emplacement areas will be targeted as a priority.	In progress.
PA10_0015 Appendix 7 Statement of Commitments	**Visual Amenity** (c) In addition to retaining areas of existing remnant vegetation, it is proposed to restore approximately 206 hectares (58 percent) of the disturbed area within the Project Site as rehabilitated woodland. This large area, which includes the western slopes of the Northern and Western Emplacement Areas, will blend in well with the retained remnant vegetation areas within the Project Site and within the adjacent Vickery State Forest and "Yarrawonga" property.	In progress.

PA10_0015 Appendix 7 Statement of Commitments	**Visual Amenity** (d) Strategically placed woodland tree lots will be integrated into the post-mining landform to break-up the landform and provide visual texture. This will be complimented by the establishment of pasture grass areas that will provide short-term visual impact mitigation prior to the trees becoming established.	In progress.

4.2 POST-MINING LAND USE GOALS AND FUTURE USE OF THE SITE

The overall closure goal for the Rocglen Coal Mine is to establish a stable and safe landform that is commensurate with the surrounding topography and which maximises the return to an appropriate agricultural land use comparable to the pre-mining land use, but is considerate of the fact that the landform is a backfilled mining area. The rehabilitation strategy also includes the enhancement of habitat value and ecosystem connectivity.

The conceptual final landform rehabilitation plan which details the proposed post-mining future land use(s) is provided on Plan 4.

4.2.1 Biodiversity Enhancement

The post-mining landform will include approximately 123.3 hectares (ha) of land rehabilitated with woodland species to enhance biodiversity values of the area. The rehabilitation of disturbed areas with woodland species targets the enhancement of habitat and movement corridors.

4.2.2 Pasture

The post-mining landform (including select areas of the out-of-pit emplacement and final depression) will include approximately 149.2 ha of land rehabilitated with a mix of native and exotic pasture species. Pasture rehabilitation areas will be created with a mix of land capability classes that is generally in accordance with the pre-mining environment to restore the potential for some productive grazing areas with characteristics similar to pasture areas in the general locality.

It is expected that this area will be used for grazing purposes following closure of the Rocglen Coal Mine by future landowner/s. WHC may alternatively elect to retain ownership of the land and lease the area for ongoing agricultural use.

4.2.3 Final Depression Highwall and Endwall

Following cessation of mining the open cut would be partially backfilled, resulting in a minimum elevation of approximately 244 m AHD .

To ensure the ongoing stability of slopes retained in the final landform, geotechnical assessment and survey of all key areas will be undertaken during the Closure MOP term to assess the stability of the landform and to verify that it has been constructed in accordance with the final landform shown in Plan 4. Survey or remote sensing of the rehabilitated landforms would be undertaken to identify any evidence of slumping or weathering that could compromise the stability of the landform.

4.2.4 Retained Infrastructure and Water Management

Following mine closure, it is intended to retain some additional clean water dams and some access tracks (Plan 4). Decommissioning of infrastructure present at the commencement of the MOP term is described in Section 7.3 and an indicative timeline and asset register is provided in Appendix C.

It is expected that any retained water would be used for ongoing agricultural (e.g. stock watering), or mine related, purposes following closure of the Rocglen Coal Mine.

4.3 REHABILITATION AND CLOSURE OBJECTIVES

Key rehabilitation objectives to achieve the desired post-mining land use goals have been separated into short-term and long-term categories.

The short-term and majority of long-term rehabilitation objectives are expected to be completed during the MOP term; however, some long-term objectives (e.g. monitoring rehabilitation success) would be continued beyond mine closure as required.

4.3.1 Short-term Rehabilitation and Closure Objectives

Short-term rehabilitation and closure objectives at the Rocglen Coal Mine include:

- to complete actions detailed in Table 9 as detailed in the 2019 Aspect Ecology Rehabilitation Report.
- to schedule operations including overburden/interburden emplacement and shaping and revegetation to achieve target final landform/landuse, and minimise visual exposure;
- to rehabilitate areas of disturbance no longer required for mining-related operations;
- to apply soil (topsoil/subsoil) to the final landform based on material availability and post-mining land use;
- to stabilise all earthworks, drainage lines and disturbed areas in order to minimise erosion and sedimentation; and
- to control vermin, feral animals and noxious weeds.

4.3.2 Long-term Rehabilitation and Closure Objectives

Long-term rehabilitation and closure objectives at the Rocglen Coal Mine include:

- continuation and/or restoration of biodiversity and ecological integrity of areas affected by mining or agriculture within the mining leases;
- to establish a low maintenance, geotechnically stable final landform commensurate with agricultural and nature conservation land uses;
- to blend the created landforms to appear as a natural extension with the surrounding landforms;
- to provide habitat for fauna and corridors for fauna movement within the final landform;
- to monitor rehabilitation success in terms of physical and biological parameters; and
- to achieve relinquishment status of rehabilitated and decommissioned areas.

Table 9 - Proposed measures or Actions (taken from the 2019 mine rehabilitation report)

The below table outlines proposed measures or actions to improve progressive rehabilitation performance at Rocglen Coal Mine. The table provides an indicative timeline, and outline of the implementation of works.

Item #	Theme	Proposed measures or actions	Outline of the implementation of works	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions
1	Progressive rehabilitation	Annual rehabilitation planning process	Develop and implement an annual rehabilitation planning process that details how the MOP commitments will be achieved. Include suitable drought adaptation and resilience components and integrate into the rehabilitation plan. These components should detail protocols to facilitate successful ecosystem establishment and sustainability in the context of current and future climatic conditions of northwestern NSW. To facilitate this, the Annual Rehabilitation Plan should detail protocols for: • Achieving MOP commitment • management and/or risk assessment tools for post-mining ecosystem rehabilitation (e.g. Halwatura *et al.* 2015); • predicting seasonal conditions, and adjusting the rehab program to suit; • monitoring environmental conditions (e.g. soil moisture); Risk and triage analyses of current and future rehabilitation investments	December 2020	4.1; 4.2; 4.3; 4.4; 4.5.1	An Annual rehabilitation planning process will be developed and implemented during 2020

Table 9 (Continued)- Proposed measures or Actions (taken from the 2019 mine rehabilitation report)

The below table outlines proposed measures or actions to improve progressive rehabilitation performance at Rocglen Coal Mine. The table provides an indicative timeline, and outline of the implementation of works.

Outline of the implementation of works	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions
2	Progressive rehabilitation	Mine planning– Rehabilitation Program Integration	Enact a program to integrate rehabilitation into mine planning activities.	December 2020	4	Short term mining procedure will include rehabilitation into the mine planning process.
3	Record keeping & Monitoring	Record keeping practices review	Implement a procedure for rehabilitation-, soil-, vegetation- and biodiversity- monitoring and record keeping practices with the objective of ensuring that the requirements specified in applicable plans, programs and strategies are recorded and controlled include tracking the implementation of corrective actions. The specified procedure should include (without limitation) detail on how required corrective measures are recorded and controlled.	December 2020	4.1; 4.5.1	A recorded keeping process will be included in the annual rehabilitation plan. Rehabilitation actions will be entered and tracked using the Environmental compliance management system (CMO)
4	Record keeping	Rehabilitation spatial data maintenance	Implement a protocol of keeping rehabilitation data up to date with Rehabilitation Phase changes. This should include integrating data attributes relating to rehabilitation (e.g. ameliorant application rate, seed mix, soil source) into the rehabilitation polygon feature class. This data can then be utilised to understand contributing factor into rehab success or failure.	December 2020	4.1; 4.2; 4.3; 4.4; 4.5.1	A protocol of keeping rehabilitation data up to date will be implemented and linked to the annual rehabilitation Plan

Table 9 (Continued)- Proposed measures or Actions (taken from the 2019 mine rehabilitation report)

The below table outlines proposed measures or actions to improve progressive rehabilitation performance at Rocglen Coal Mine. The table provides an indicative timeline, and outline of the implementation of works.

Outline of the implementation of works	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions
5	Ecosystem Establishment and Sustainability	Rehabilitation monitoring gap analysis and reimplementation	Conduct a gap analysis, then redesign and implement the new rehabilitation monitoring program. The core objective would be to evaluate whether the monitoring methodologies currently employed align with the final land use objective for closure.	December 2020	4.4.7	A Gap analysis will be commissioned within the required timeframe.
6	Biodiversity Management	Weed monitoring and management	Implement a weed monitoring procedure within the lease boundaries. The developed methodology should be implemented with the objective of delivering data such that weed treatment can: • ensure that obligations under the *Biosecurity Act 2015* can be met; • ensure that weed densities do not interfere with any of the rehabilitation performance indicators; and • track weed treatment effectiveness and weed population dynamics.	December 2020	4.5.1	Document the current weed treatment process into a procedure. Procedure will be implemented within the required timeframe.
7	Training & development: organisational learning	Rehabilitation knowledge sharing program	Implement a process for rehabilitation-, soil-, vegetation- and biodiversity- related knowledge sharing between business units to appropriately utilise the knowledge, skills and resources already existing in the organisation.	December 2020	4	A process for sharing rehabilitation knowledge within the business will be implemented within the required timeframe.

Table 9 (Continued)- Proposed measures or Actions (taken from the 2019 mine rehabilitation report)

The below table outlines proposed measures or actions to improve progressive rehabilitation performance at Rocglen Coal Mine. The table provides an indicative timeline, and outline of the implementation of works.

Outline of the implementation of works	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions
8	Soil management	Stockpile weed and erosion management	Control weeds from stockpiles and reseed local native grass species.	December 2020	4.1	Review stockpiles and control weeds. Stockpiles not designated for use this rehab season will be seeded with native grasses
9	Soil management	Stockpile rehabilitation	Divert the light vehicle track that links the western boundary track with the mine compound around stockpile T18 and reseed the stockpile. Alternatively, the topsoil could be respread on final landform and the current alignment maintained.	Complete	4.1	Stockpile track closed.
10	Growing Media Development	Soil testing existing Woodland Domain rehabilitation	Carry out soil testing across existing areas of Woodland Domain rehabilitation, to inform soil amelioration and replanting campaigns for next year's planting campaign.	December 2020	4.3	Complete soil testing across the northern emplacement to inform amelioration requirements prior to 2020 plant out

Table 9 (Continued)- Proposed measures or Actions (taken from the 2019 mine rehabilitation report)

The below table outlines proposed measures or actions to improve progressive rehabilitation performance at Rocglen Coal Mine. The table provides an indicative timeline, and outline of the implementation of works.

Outline of the implementation of works	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions
11	Biodiversity management	Weed monitoring and management	Carry out weed control within the period recommended by monitoring, weather conditions permitting. Including progressive eradication or remove exotic pasture groundcover.	December 2020	4.5.2	Weed control will be carried out as recommended by monitoring and weather conditions. Include this detail in the weed control procedure.
13	Ecosystem Establishment	Ground stratum plantings/ seeding	Include shrubs and/or groundcover species typical of Narrow leaved Ironbark- cypress pine – White Box shrubby open forest (Plant Community Type ID 592 in the BioNet Vegetation Classification System) in next year's plant out.	December 2020	4.4.2	Trees and grasses typical of Narrow leafed ironbark will be included in 2020 plant out season.
14	Ecosystem Establishment	Seedling plant-out readiness	Informed by best practice information, Prior to next year's plant out implement a protocol to confirm that prior to planting seedlings: • are at an appropriate level of maturity • have been exposed to suitable water and sun exposure hardening-off regimes.	Before next plant out in 2020	4.4	A review of the current nursery hardening off procedure. And update if required during 2020 seedling development year.

Table 9 (Continued)- Proposed measures or Actions (taken from the 2019 mine rehabilitation report)

The below table outlines proposed measures or actions to improve progressive rehabilitation performance at Rocglen Coal Mine. The table provides an indicative timeline, and outline of the implementation of works.

Outline of the implementation of works	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions	Indicative Timeline	Addresses issue(s) identified in section(s) of the rehabilitation report	Whitehaven coal Actions
15	Ecosystem Establishment	Seedling guards	Utilise tree guards for tree planting campaign	December 2020	4.4	Guards are ordered and will be utilised for 2020 tree planting
16	Ecosystem Establishment	Pasture Domain erosion control and reseeding	Undertake an evaluation of the effectiveness of current erosion controls in the Pasture Domain polygon RCM060, and then reseeded with native pasture grasses where required.	December 2020	4.4.6	A review of current erosion control within RCM060 will be reviewed and improved as required.

5 REHABILITATION AND CLOSURE PLANNING AND MANAGEMENT

5.1 DOMAIN SELECTION

Primary and secondary domains have been defined in accordance with the methodology prescribed in the MOP Guidelines.

The primary domains represent the set of discrete areas that have a particular operational or functional purpose. All areas previously disturbed by mining, or proposed to be subject to the activities described in the sections below, have been assigned to an appropriate primary domain.

The relevant primary domains at the Rocglen Coal Mine are defined in Table 10. The footprint of each primary domain at the commencement of the Closure MOP term is depicted on Plan 2.

Table 10
Primary Domains

Primary Domains	Code	Description
Infrastructure	1	Footprint of areas disturbed for existing and decommissioned infrastructure including; amenity facilities, sealed and unsealed roads and carparks and maintenance areas.
Water management area	3	The network of clean water and dirty water dams and associated infrastructure used for operational and rehabilitation water management.
Overburden emplacement area	4	Footprint of out-of-pit overburden waste dumps.
Stockpiled material	5	Material stockpiled for future management, (e.g. soil resources).
Void (Open cut void)	6	Open cut footprint.
Rehabilitation area	7	Footprint of existing rehabilitation areas.
Undisturbed areas	8	Footprint of undisturbed areas within the mining lease.

Secondary domains have been selected to reflect the proposed post-mining and future land use described throughout Section 4 and have been selected in consideration of the MOP Guidelines.

Secondary domains are shown on Plans 2 to 4, and are described in Table 11.

Table 11
Secondary Domains

Secondary Domains	Code	Description
Infrastructure	A	Infrastructure to be retained following relinquishment including some access tracks.
Water management areas	B	The network of dams and water management structures retained in the final landform. Dams will provide water resources for grazing areas and native fauna.
Rehabilitation areas - Pasture	D	Areas rehabilitated with native pasture species to a rural land capability of (at least) Class VI, sufficient to sustain a grazing land use.
Rehabilitation areas - Woodland	E	Areas rehabilitated with native vegetation species analogous to adjacent remnant vegetation communities in the areas surrounding the Rocglen Coal Mine. Native vegetation areas will have characteristics similar to existing analogue sites to provide suitable habitat and movement corridors for native fauna.
Final Depression	I	Final depression constructed with batters of generally 14 degrees.
Conservation Area	J	Enrichment zones/New Vegetation - Areas undisturbed by mining activities (including remnant vegetation and pasture areas), preserved and enhanced with supplementary plantings to enhance biodiversity values such as movement corridors.

5.2 DOMAIN REHABILITATION AND CLOSURE OBJECTIVES

Rehabilitation and closure objectives for the domains identified in the sections above are described in Table 12.

Table 12
Domain Rehabilitation and Closure Objectives

Domain	Code	Rehabilitation Objective
Primary Domains		
Infrastructure	1	Infrastructure will be progressively decommissioned and removed from site when no longer required. Unless agreed with stakeholders, all infrastructure and services will be removed from site (except for some access tracks). All land contamination/hazardous/carbonaceous materials will be identified and appropriately removed or remediated. Infrastructure areas will be rehabilitated with a combination of native vegetation and pasture areas.
Water management areas	3	Downstream water users are not adversely affected by the mine's operation. Where practical clean water has been diverted around disturbance areas. Dirty water run-off (including rehabilitation areas) will be captured and treated prior to discharge in accordance with EPL discharge criteria. Sediment dams and associated structures (including diversion drains and banks) will be retained until the catchment is completely rehabilitated and run-off is considered 'clean water' run-off. Sediment dams will be progressively decommissioned when no longer required (dewatered and de-silted) and either rehabilitated or converted to clean water dams for retention in the final landform for future stock watering purposes. Some existing clean water dams will be retained in the final landform for agricultural purposes.
Overburden emplacement areas	4	Post-mining landforms will be geotechnically stable, safe and non-polluting. Overburden emplacement areas will be adequately drained with drainage structures designed and constructed with reference to *Managing Urban Stormwater, Soils and Construction manual* (Landcom, 2004) (Blue Book). Overburden emplacement areas will be shaped with slopes generally 10 degrees. Overburden emplacement areas will be rehabilitated with a combination of native vegetation and pasture areas.
Stockpile areas	5	Soil stockpiles have been established and maintained. Soil stockpiles have been located in areas not proposed to be disturbed for mining to minimise the potential for stockpiles to require relocation. Following soil re-use, stockpile areas will be lightly ripped and revegetated with pasture or native vegetation communities according to the section of final landform in which the stockpile was located.
Void (Open cut void)	6	The open cut will be partially backfilled with overburden and shaped to a depth of 244m AHD. The final depression will be geotechnically stable, safe and non-polluting.
Rehabilitation area	7	As per objectives for the appropriate secondary domain.
Undisturbed areas	8	As per objectives for the appropriate secondary domain

Table 12 (continued)
Domain Rehabilitation and Closure Objectives

Domain	Code	Rehabilitation Objective
Secondary Domains		
Infrastructure	A	Retained infrastructure. Some access tracks will be retained in the final landform for use by post-mining landholders.
Water management areas	B	The final landform drainage will be designed and constructed to integrate with surrounding catchments. Some clean water dams will be retained (Plan 4). Final landform drainage will be designed and constructed to minimise erosion and enhance geomorphic stability. The final landform water management will not adversely impact downstream water users.
Rehabilitation areas - Pasture	D	Pasture areas with characteristics comparable with analogue sites will be established on selected areas disturbed by mining (e.g. former infrastructure areas, final depression) (Plan 4). Grazing rehabilitation areas will comply with (at least) a Rural Land Capability of Class VI. Management inputs required to sustain grazing will be in the range of analogue sites.
Rehabilitation areas - Woodland	E	Native vegetation with characteristics comparable with analogue sites will be established on selected areas disturbed by mining (e.g. overburden emplacement slopes) (Plan 4). Local provenance seed will be used for woodland rehabilitation areas. Woodland rehabilitation areas will contribute to habitat resources for local fauna and provide linkages with adjacent native vegetation.

5.3 REHABILITATION PHASES

Achievement of the agreed post-mining land use will be through a series of conceptual rehabilitation phases. These phases of rehabilitation are described in Table 13. The rehabilitation phase applicable to each domain at the end of the Closure MOP term is shown in Table 14.

Table 13
Rehabilitation Phases

Phase	Description
Decommissioning	The process of removing plant and equipment from active services and rendering the area safe for humans, wildlife and stock.
Landform Establishment	The process of shaping sub-stratum material into a desired land surface profile. This includes earthworks activities such as cut and fill, encapsulation of potentially problematic material, rock raking, water storage and drainage construction.
Growth Medium Development	The process of establishing and enhancing the physical structure, chemical properties and biological properties of a soil stratum suitable for plant growth. This includes placing and spreading recovered subsoil and topsoil resources and applying ameliorants.
Ecosystem Establishment	The process of seeding, planting and transplanting plant species. Incorporates management actions such as weed and feral pest control to achieve species establishment and growth to juvenile communities, and habitat augmentation.
Ecosystem Sustainability	The process of applying management techniques to encourage planted vegetation to grow and develop towards a desired and sustainable post-mining land use outcome. Incorporates features including species reproduction, nutrient recycling and community structure.
Land Relinquishment	The completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mining tenement.

Table 14
Summary of Rehabilitation Phases at the End of the Closure MOP Term

Domain / Rehabilitation Phase	Infrastructure – Rehabilitation Area Pasture (1D)	Infrastructure – Rehabilitation Area Woodland (1E)	Water Management Area – Retained Water Management Area (3B)	Water Management Area – Rehabilitation Area Pasture (3D)	Overburden Emplacement Area – Rehabilitation Area Pasture (4D)	Overburden Emplacement Area – Rehabilitation Area Woodland (4E)	Stockpiled Material – Rehabilitation Area Pasture (5D)	Stockpiled Material – Rehabilitation Area Woodland (5E)	Void (Open Cut Void) – Rehabilitation Area Pasture (6D)	Void (Open Cut Void) – Rehabilitation Area Woodland(6E)	Rehabilitation Area – Rehabilitation Area Pasture (6D)	Rehabilitation Area – Rehabilitation Area Woodland(6E)
Active	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phase 1 Decommissioning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phase 2 Landform Establishment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phase 3 Growth Medium Development	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phase 4 Ecosystem and Land Use Establishment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Phase 5 Ecosystem and Land Use Sustainability												
Phase 6 Relinquished Lands												

6 PERFORMANCE INDICATORS AND COMPLETION CRITERIA

Tables 15 to 20 detail rehabilitation objectives, indicators and completion criteria for each rehabilitation phase for all domains.

Table 15
Decommissioning Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
All Domains						
Public safety.	Site security.	Security measures (e.g. Mining Lease boundary fencing) have been implemented (where required) prior to commencing decommissioning and demolition works.	Closure MOP Section 3.2.14	No	No	Ongoing
Domain 1 – Infrastructure						
All infrastructure and services will be removed from site (except as previously described) prior to relinquishment.	Demolition of infrastructure.	All demolition work has been carried out in accordance with *AS2601-2001: The Demolition of Structures* or its latest version.	AS2601 - 2001	No	No	To commence
		All surface infrastructure that is not required for the post-mining land use has been demolished (or dismantled) and removed from the site.	Closure MOP Section 5.2	No	No	To commence
	Site services.	All site electricity and telecommunication services have been disconnected and removed.	Closure MOP Section 5.2	No	No	To commence
	Foundations and pavements.	All concrete footings, foundation pads and pavements have been removed.	Closure MOP Section 5.2	No	No	To commence
All hazardous and contaminated materials are appropriately removed or remediated in accordance with the recommendations of a contamination site assessment.	Carbonaceous material.	Any carbonaceous material has been removed from the footprint of the infrastructure areas and disposed of in the void, with at least 3m cover (supported by records).	Closure MOP Section 5.2	No	Yes	To commence
	Hazardous materials.	Site investigation records indicate that infrastructure areas are free of any hazardous materials.	Closure MOP Section 5.2	No	No	To commence
	Contaminated soils.	Records indicate that contaminated soils have been identified and remediated or removed in accordance with legislation.	Closure MOP Section 5.2 EPA 1998 NEPC 1999	No	No	To commence
Domain 3 – Water Management Areas						
Mine water dams and sediment dams are desilted and decontaminated prior to conversion to clean water dams or backfilling and regrading into in the final landform.	Dam sediments.	Sediment accumulated in mine water and sediment dams is removed and emplaced in the final depression with adequate inert cover, supported by records.	Closure MOP Section 5.2	No	No	To commence

Table 16
Landform Establishment Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
All Domains						
Post-mining landforms will be geotechnically stable, safe and non- polluting landforms that blend with the surrounding topography and that are suited to the nominated post-mining land uses.	Slopes.	Rehabilitated slopes are verified by survey to be generally 10 degrees (out-of-pit) and 14 degrees (in-pit).	Closure MOP Section 5.2	No	Yes	Commenced
	Stability.	Survey or remote sensing of the rehabilitated landforms shows an absence of slumping that could compromise stability.	Closure MOP Section 8.1	No	Yes	Ongoing
	Discharge water quality.	Dirty water is captured and discharged in accordance with the EPL (supported by records).	EPL 12957	No	Yes	Ongoing
	Visual.	The regraded landform blends with the surrounding topography.	Closure MOP Section 4.3	No	No	Ongoing
Domain 3 – Water Management Areas						
Safe, stable, adequately drained post-mining landforms consistent with the surrounding landscape and downstream water users are not adversely affected.	Final landform drainage.	The design for all erosion and sediment control structures will be consistent with Blue Book requirements.	Closure MOP Section 5.2	No	Yes	Ongoing
	Geomorphic stability.	Visual assessment by a specialist certifying that drainage structures are stable with no active gully heads, tunnel erosion or bank failure that are likely to compromise the long-term stability of the structure.	Closure MOP Section 5.2	No	Yes	Ongoing
	EPL discharge criteria.	All discharge water quality criteria complies with EPL 12870.	EPL 12870	No	Yes	Ongoing
Domain 4 – Overburden Emplacement Areas						
Create a landform that blends with the adjoining landscape.	Landform compatibility.	Landforms are surveyed and demonstrated to be constructed in accordance with the final landforms shown in MOP Plan 4.	Closure MOP Plan 4	No	No	Ongoing
	Slopes.	Slopes on the final landform designed and constructed to minimise erosion and are assessed to be stable. The final batter slopes for the Overburden Emplacement Area generally 10 degrees.	Closure MOP Section 3.2.3 and 5.2	No	Yes	Ongoing

Table 16 (continued)
Landform Establishment Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
Domain 6 - Void (Open Cut Void)						
Post-mining landforms will be geotechnical stable, safe, and non-polluting.	Design.	The void design and implementation is as per nominated criteria in the MOP and assessed by a suitably qualified and experienced geotechnical engineer to validate the landform is stable and does not pose an unacceptable safety risk. The final depression is backfilled to 244m AHD verified by survey.	Closure MOP Sections 4.2.2, 4.2.3 and 5.2	No	No	Ongoing
	Stability.	There is no evidence of settlement or slumping in the landform that would cause a safety issue.	Closure MOP Sections 4.2.2, 4.2.3 and 5.2	No	Yes	To commence
	Slopes.	Final depression slopes have been constructed to generally 14 degrees.	Closure MOP Sections 4.2.2, 4.2.3 and 5.2	No	Yes	To commence
	Carbonaceous materials.	All coal and carbonaceous material is capped with a minimum of 3m of inert overburden, subsoil and topsoil (supported by records).	Closure MOP Section 5.2	No	Yes	Ongoing
	Erosion.	There is no evidence of slumping or uncontrolled erosion that could compromise stability prior to commencement of growth medium development phase.	Closure MOP Section 5.2	No	Yes	Ongoing
		Active erosion is assessed to be not compromising landform stability prior to commencement of growth medium development phase.	Closure MOP Section 5.2	No	Yes	Ongoing
	Spontaneous combustion.	There is no evidence of spontaneous combustion prior to commencement of growth medium development phase.	Closure MOP Section 3.2.1.3	No	Yes	Ongoing

Table 17
Growth Medium Development Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
All Domains						
Topsoil and subsoil resources are salvaged and maintained for use in rehabilitation.	Topsoil depth.	Rehabilitation records verify that rehabilitation areas topsoiled with a nominal depth of 100-150 mm, where available.	Closure MOP Section 3.2.7	No	No	Commenced
	Subsoil depth.	Rehabilitation records verify that rehabilitation areas include subsoil with a nominal depth of 100-150 mm, where available.	Closure MOP Section 3.2.7	No	No	Commenced
Erosion is minimised.	Temporary Erosion and Sediment Control (ESC).	Temporary ESCs are installed prior to topsoil re-spreading.	Closure MOP Section 3.2.3	No	No	Ongoing
		Topsoiled rehabilitation areas are sown with a non-persistent cover crop at the recommended sowing rate per hectare.	Closure MOP Section 7.2.4	No	No	Ongoing
Subsoils and topsoils will be characterised prior to re-spreading	Soil parameters.	Rehabilitation monitoring verifies soil characteristics such as pH, Electrical Conductivity, Exchangeable sodium percentage, nitrogen and phosphorous are generally in the range of analogue sites or do not appear to be limiting plant performance.	This Closure MOP	No	Yes	Ongoing
Soils are ameliorated where determined necessary	Ameliorant application.	Soil ameliorants (e.g. gypsum, mulch, biosolids, composts) are applied where necessary (supported by records).	Closure MOP Section 5.2	No	Yes	Ongoing

Table 18
Ecosystem Establishment Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
All Domains						
Weeds and feral animals do not present a risk to rehabilitation.	Weed presence.	Monitoring verifies there are no significant weed infestations and weeds do not comprise a significant (> 50%) proportion of the species in any stratum.	Closure MOP Section 3.2.9, 8.1.2 and 8.1.3	No	Yes	Ongoing
		Monitoring records indicate that noxious weeds are controlled in accordance with legislation and the MOP.	This Closure MOP, Biosecurity Act 2015.	No	Yes	Ongoing
	Feral animal density.	Monitoring records indicate that feral and pest animal species are controlled in accordance with relevant legislation and the MOP.	Closure MOP Section 3.2.10 Game and Feral Animal Control Act 2002, Local Land Services Act 2013 , Biosecurity Act 2015	No	Yes	Ongoing
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).	Closure MOP Section 5.2	Yes	No	Ongoing
Bushfire risks are managed to minimise the risk to rehabilitation.	Bushfire.	Bushfire mitigation actions, including monitoring and managing fuel loads, maintaining fire-breaks, firefighting equipment and access, storage and handling of hydrocarbons, welding procedures and no smoking signage are implemented in accordance with the Bushfire Management Plan.	Closure MOP Section 3.2.11	Yes	No	Ongoing
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.	This Closure MOP	No	Yes	Ongoing
		Monitoring verifies there are no active gully or tunnel erosion features, or rills >300 mm deep or wide.	This Closure MOP	No	Yes	Ongoing

Table 18 (continued)
Ecosystem Establishment Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
Domain D - Rehabilitation Areas Pasture						
Re-establishing agricultural land over the areas disturbed by the mine.	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.	Closure MOP Sections 4.2.2 and 5.2	No	Yes	Ongoing
Pasture areas will be capable of sustaining grazing with land capability that reflects the pre-mining environment.	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 Table 22.	Closure	No	Yes	Ongoing
	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 of rehabilitation undertaken in accordance with this MOP to quantify pasture crop establishment.	This Closure MOP	No	Yes	Ongoing
		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.	This Closure MOP	No	No	Ongoing
	Vegetation health.	Rehabilitation monitoring shows that pasture health is comparable to analogue sites.	This Closure MOP	No	No	Ongoing

Table 18 (continued)
Ecosystem Establishment Phase

Domain Objective	Indicator	Completion Criteria								Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
Domain E – Rehabilitation Areas Woodland		**Time since Initial Revegetation**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**				
Woodland rehabilitation revegetation for Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest (BVT 316 and PCT 592) as consulted with OEH September 2018	Native Species Richness	Mean Target	2	5	7	10	12	14	17	Powerpoint Presentation used to consult with OEH in September 2018 titled "WHC-OEH Woodland Revegetation Completion Criteria Meeting 25Sept18. pptx"	No	Yes	Not commenced
		Minimum Target	2	4	6	8	10	11	13				
	Native Overstorey Cover	Mean Target	4%	8%	12%	16%	20%	24%	28%		No	Yes	Not commenced
		Minimum Target	0%	0%	0%	0%	0%	0%	0%				
	Native Mid-storey Cover	Mean Target	3%	5%	8%	10%	13%	15%	18%		No	Yes	Not commenced
		Minimum Target	1%	1%	2%	2%	3%	4%	4%				
	Native Groundcover (Grasses)	Mean Target	3%	6%	9%	12%	15%	18%	21%		No	Yes	Not commenced
		Minimum Target	2%	4%	6%	8%	10%	12%	14%				

Table 19
Ecosystem Sustainability Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
All Domains						
Weeds are controlled.	Weed presence.	Rehabilitation monitoring verifies there are no significant weed infestations and that weed presence is comparable to analogue sites and does not present a risk to rehabilitation.	Closure MOP Section 3.2.9, 8.1.2 and 8.1.3	No	Yes	Ongoing
		Monitoring records indicate that noxious weeds are controlled in accordance with relevant legislation and the MOP.	This Closure MOP, Biosecurity Act 2015	No	Yes	Ongoing
Feral animal pests are controlled.	Feral animal density.	Monitoring records indicate that feral and pest animal species are controlled in accordance with relevant legislation and the MOP.	Closure MOP Section 3.2.10 and 5.2, Game and Feral Animal Control Act 2002, Local Land Services Act 2013 , Biosecurity Act 2015	No	Yes	Ongoing
Management measures will be implemented to minimise bushfire risks in rehabilitation areas.	Bushfire risk management.	Bushfire mitigation actions including managing fuel loads, maintaining fire-breaks and firefighting access are implemented where necessary.	Closure MOP Section 3.2.11	No	No	Ongoing
Erosion does not present a safety hazard or compromise the post-mining land capability.	Erosion and Sediment Control.	There is an absence of rilling (> 300 mm deep) within each domain.	Closure MOP	No	Yes	Ongoing
		Risk assessment determines that no significant erosion is present that constitutes a safety hazard or compromises the capability of the supporting the post-mining land use.	Closure MOP Section 3.2.3	No	Yes	Ongoing

Table 19 (continued)
Ecosystem Sustainability Phase

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
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.	Closure MOP	No	Yes	Ongoing
	Surface cover.	Rehabilitation monitoring records verify that ground cover (vegetation, leaf litter, and mulch) is greater than 85 %.	Closure MOP Sections 8.1.2 and 8.1.3	No	Yes	Ongoing
Domain B - 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.	EPL12870	Yes	Yes	Ongoing
	Geomorphic stability.	Water management structures are assessed to be stable.	Closure MOP Section 5.2	No	Yes	To commence
Domain D – Rehabilitation Areas - Pasture						
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 as listed in Table 21.	Closure MOP Sections 5.2 and 8.1.2	No	Yes	Ongoing
	Regeneration.	Established species survive and/or regenerate after disturbance.	This Closure MOP	No	No	Ongoing
		Species are capable of setting viable seed, flowering or otherwise reproducing.	This Closure MOP	No	No	Ongoing
	Vegetation health.	Rehabilitation monitoring verifies that vegetation health is comparable to reference sites.	This Closure MOP	No	No	Ongoing
	Land capability.	Pasture areas are assessed to have a Rural Land Class VI or better (capable of sustaining grazing), consistent with the final landform.	Closure MOP Sections 5.2 and 8.1.2	No	No	Ongoing

Table 19 (continued)
Ecosystem Sustainability Phase

Domain Objective	Indicator	Completion Criteria				Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
Domain E – Rehabilitation Areas - Woodland		**Methodology**	**Benchmark**	**BVT NA 316**	**Local Analogue**				
Woodland rehabilitation revegetation for Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest (BVT 316 and PCT 592) as consulted with OEH September 2018 to restore woodland habitat	Native Species Richness	Measured following BBAM methodology will target between the Benchmark and Analogue Site values.	Mean Target	24	TBA	Powerpoint Presentation used to consult with OEH in September 2018 titled "WHC-OEH Woodland Revegetation Completion Criteria Meeting 25Sept18. pptx"	No	Yes	Not commenced
			Minimum Target	19	Not Available				
	Native Overstorey Cover	Measured following the BBAM methodology will target between the Benchmark and Analogue Site values.	Mean Target	40%	TBA		No	Yes	Not commenced
			Minimum Target	25%	Not Available				
	Native Mid-storey Cover	Measured following BBAM methodology will target between the Benchmark and Analogue Site values.	Mean Target	25%	TBA		No	Yes	Not commenced
			Minimum Target	6%	Not Available				
	Native Groundcover (Grasses)	Measured following BBAM methodology will target between the Benchmark and Analogue Site values.	Mean Target	30%	TBA		No	Yes	Not commenced
			Minimum Target	20%	Not Applicable				

* To be aligned with other Whitehaven Coal Mines targets required in accordance with the Leard Forest Regional Biodiversity Strategy, the Native Plant Species Richness is set at 80% of the OEH (2017) Visual Information Database for Export of Benchmarks for Biometric Vegetation Type (BVT) NA (Namoi Catchment) 316 and Plant Community Types (PCT) Benchmarks for Brigalow Belt South (BBS) 592 Narrow-leaved Ironbark - cypress pine - White Box shrubby open forest in the Brigalow Belt South Bioregion and Nandewar Bioregion.

Table 20
Relinquishment

Domain Objective	Indicator	Completion Criteria	Justification/ Source	Complete (Yes/No)	Link to TARP	Progress at start of Closure MOP
All Secondary Domains						
Site will be restored to a landform capable of sustaining the post-mining land uses.	Completion criteria.	All relevant completion criteria for the land proposed for relinquished (Phases 1 to 5) are acknowledged to be met by the Resource Regulator (or contemporary equivalent).	This Closure MOP	No	No	Not commenced
	Access tracks.	Access tracks not required in the final landform are decommissioned and rehabilitated.	Closure MOP Sections 4.2.4 and 5.2	No	No	Not commenced
	Monitoring points.	Any ancillary disturbance or equipment associated with surface water and rehabilitation monitoring points is removed and/or rehabilitated.	Closure MOP Section 5.2	No	No	Not commenced
	Groundwater bores.	Groundwater monitoring bores located within the ML that are not to be retained post-mining are decommissioned and sealed in accordance with guidelines.	Closure MOP Section 5.2	No	No	Not commenced
	Land ownership.	Land ownership and/or lease arrangements are finalised (if applicable).	Closure MOP Sections 4.2.4 and 5.2	No	No	Not commenced
Domain A – Infrastructure						
Land associated with existing access tracks will be retained for post-mining use.	Statutory responsibility.	Statutory responsibility for retained infrastructure, and associated licences is transferred (if required) and excised from ML 1620/1662.	Closure MOP Sections 4.2.4 and 5.2	No	No	Not commenced
Domain B – Water Management Area						
Downstream water users are not impacted by mining at the Rocglen Coal Mine	Water quality.	Water quality achieves criteria and EPL12870 is surrendered.	EPL12870	No	Yes	Ongoing

7 REHABILITATION AND CLOSURE IMPLEMENTATION

7.1 STATUS AT MOP COMMENCEMENT

Table 21 describes the status of each domain at the commencement of this Closure MOP period. This information is also presented graphically in Plan 2.

Table 21
Status at Closure MOP Commencement

Code	Domain	Status at Closure MOP Commencement
Primary Domains		
1	Infrastructure	This domain is currently active and subject to ongoing operations.
3	Water management area	This domain is currently active and subject to ongoing operations.
4	Overburden emplacement area	This domain is currently active and subject to ongoing operations.
5	Stockpile areas	This domain is currently active and subject to future operations. Remaining soil stockpiles are temporarily stabilised and will be retained for future rehabilitation of infrastructure areas.
6	Void (Open cut void)	This domain is currently active and subject to ongoing operations.
7	Rehabilitation areas	This domain is currently active and is subject to future disturbance, ongoing maintenance and land management activities.
8	Undisturbed areas	This domain is undisturbed and is subject to ongoing maintenance and land management activities.
Secondary Domains		
A	Infrastructure	This domain is currently active and subject to ongoing operations.
B	Water management area	This domain is currently active and subject to ongoing operations.
D	Rehabilitation area - Pasture	This domain is currently active and subject to ongoing operations
E	Rehabilitation area - Woodland	Woodland rehabilitation has been established at the commencement of the Closure MOP term, consisting of the out-of-pit dump batters. This domain is subject to future disturbance, ongoing maintenance and land management activities.
J	Conservation Area	Enrichment zone/New vegetation. These areas currently remain undisturbed and scheduled for further habitat/corridor enhancement planting.

7.2 PROPOSED REHABILITATION ACTIVITIES DURING THE CLOSURE MOP TERM

Rehabilitation and maintenance of rehabilitation in completed areas will be undertaken throughout the Closure MOP term. Table 22 summarises the forecast total disturbance and rehabilitation areas at the Rocglen Coal Mine over the Closure MOP term.

Table 22
Disturbance and Rehabilitation Progression during the term of the Closure MOP

Year	Total Disturbance Area (ha)	Total Rehabilitation Area (ha)	Cumulative Rehabilitation (ha)	Comments
Start of Closure MOP (April 2019)	208.4	163.5	163.5	See Plan 2.
Year 1 (April 2020)	207.2	1.2	164.7	See Plan 3A.
Year 2 (April 2021)	170.7	36.5	201.2	See Plan 3B.
Year 3 (April 2022)	129.2	41.5	242.7	See Plan 3C
End of Closure MOP (April 2026)	9.4	119.8	362.5	See Plan 4.

The methodology for rehabilitation activities is described in the subsections below. An indicative timeline of rehabilitation and decommissioning activities is provided in Appendix C.

7.2.1 Decommissioning Phase

The Decommissioning Phase encompasses all works required to prepare land for rehabilitation including removal of built infrastructure, foundation and hardstand materials, services, equipment and materials including wastes and contamination. An indicative timeline and asset register of decommissioning activities is provided in Appendix C.

The methodology for the decommissioning activities are described in the subsections below.

Termination of Services and Demolition Works

Activities over the Closure MOP term would include:

- Disconnection and termination of services (e.g. water and electricity).
- Demolition and removal of site office and facilities (including the weighbridge).
- Demolition and removal of coal handling infrastructure (e.g. ROM pad).
- Removal of other concrete pads and footings, if required.
- Removal of access roads and carpark, if required.
- Grouting and capping of exploration boreholes.
- Removal of internal access roads.

All demolition work could be carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*.

Contaminated Materials

The soil under and around the site office, facilities and coal handling infrastructure will be tested for contamination and remediated as required. Contaminated soil materials will be excavated and moved to a bunded area on-site for bio-remediation prior to being disposed of either off-site at a licensed facility, or onsite within void backfill, once they meet the solid waste classification. The relatively small potential volume of treated material has not been relied upon for achieving the site rehabilitation material balance.

Prior to lease relinquishment Whitehaven will verify that there are no contaminants or hazardous materials present at any infrastructure to be retained.

Water Management Structures

At the end of the Closure MOP term some clean water dams are proposed to be retained as shown on Plan 4. For the clean water dams to be retained following mine closure, minor earthworks may be required to ensure the dams are safe and stable in the long-term.

Once runoff from the final landform reaches suitable quality, some sediment dams/water dams would not be required and would be decommissioned.

The procedure for decommissioning of sediment/water dams would include:

- dewatering of the dam;

- de-silting of the dam (if required);
- assessment of any contaminants and subsequent treatment and/or removal as required (e.g. in accordance with the procedure for contaminated materials above);
- material assessment of the dam walls, with selective handling of unsuitable soil, topsoil and subsoil;
- infilling of the dam to pre-mining landform with a level of compaction (including allowance for settlement) or regrading of the dam embankments; and
- ripping and seeding for post-mining and future land use.

7.2.2 Landform Establishment

Landform establishment is the process of shaping the final landform to a safe, stable and free-draining landform that is appropriate for the desired final land use and consistent with the surrounding landscape. The final landform for the Rocglen Coal Mine is shown on Plan 4.

During the MOP term, landform establishment will involve the progressive earthworks during remaining coal extraction periods (i.e. filling behind advancing open cut operations) as well as supplementary earthworks, which would involve reshaping of the out-of-pit and in-pit overburden emplacement areas and final depression to achieve the final landform shown on Plan 4.

Upon cessation of coal extraction, Whitehaven would rehandle waste rock from the western out-of-pit waste emplacement to achieve generally 10 degree slopes. Material would be rehandled using fleet items currently approved for mining operations (e.g. dozers, excavators and haul trucks or scrapers).

The rehandle of the out of pit emplacement would where practicable include selective handling of vegetation, topsoil, and subsoil to minimise biota loss.

Material removed from the top of the waste emplacement would be used to partially backfill the open cut.

Rehabilitated slopes of the final depression will be verified by survey to be generally 14 degrees.

All coal and carbonaceous material within the final depression will be capped with a minimum of 3m of inert overburden, subsoil and topsoil (supported by approximate records).

Water management and erosion control structures will be installed as required and will be consistent with Blue Book (Landcom, 2004) requirements.

7.2.3 Growth Media Development

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

Where resources allow, stockpiled topsoil and subsoil will be re-spread onto areas requiring rehabilitation. The subsoil layer will be spread on an even but roughened surface that has been ripped along the line of the contour to break any compacted and/or smooth surfaces. Ripping will also assist the keying of subsoil into the overburden, which will, in turn, assist in the prevention of land slip and can help vegetation penetrate deep into the soil profile, encourage ingress of water and minimise erosion.

Topsoil and subsoil will be respread on rehabilitation areas following establishment of the final landform. Topsoil will be respread to a nominal depth of 100-150 millimetres (mm) and subsoil to a depth of 100-150 millimetres (mm).

7.2.4 Ecosystem and Land Use Establishment

In the context of this Closure MOP, ecosystem and land use establishment includes activities to establish the desired floristic composition (species diversity and density) and habitat features.

Domain D – Rehabilitation Area Pasture

Following the re-creation of the final landform a pasture mix will be sown by conventional agricultural methods i.e. preparation of surface to form seed bed, broadcast seeding and scarification. This will help with the stabilisation of the landform and to return the land to agricultural productivity. The pasture species will be appropriate for the season and will include but not be limited to the species identified in Table 23.

Table 23
Recommended Pasture Species Seed Mix

Native Pasture Species	Species Name	Indicative Rate (kg/ha)
Queensland Red Grass	*Bothriochloa spp.*	0.6
Queensland Blue Grass	*Dicathium spp*	0.6
Wallaby Grass	*Austrodanthonia spp*	0.6
Kangaroo Grass	*Themeda triandra*	2.2
Introduced Pasture Species		
Bombatsi Panic	-	1-2
Purple Pigeon Grass	-	1-2
Subterranean Legume	-	4-5
Barrel (Sephi) medic	-	2-4
Snail (sava) medic	-	3-5
Woolly Pod Vetch	-	4-6
Serradella (Elgara)	-	1-2
Lucerne	-	0.5
Phalaris (Sirolan or Holdfast)	-	1-2

Domain E – Rehabilitation Area Woodland

Areas to be revegetated with woodland species will be planted so as to establish habitat at the Rocglen Coal Mine. The revegetation methodology will generally be as follows:-

- target overstorey species will be collected from stock that is of regional providence and either provided to a nursery eg Narromine Transplants, for propagation into tubestock/hikos or used in seed mix and direct sown on the rehabilitation area;
- target revegetation areas will be prepared in advance, including ripping and weed control;
- tubestock/hikos will be planted in Autumn; each planting will be provided a tree guard and an initial watering;
- ongoing watering to establish the plants will occur; the frequency of which being weather dependent;
- provenance seed of mid storey and ground cover species will be collected and sown in target planting areas by conventional agricultural methods ie preparation of surface to form seed bed, broadcast seeding and scarification; and
- target revegetation areas will be subject to ongoing weed management control.

The woodland species will include but not be limited to the native species as shown in Table 24.

Table 24
Woodland Species

Common Name	Species Name
Narrow-leaved Ironbark	*Eucalyptus crebra*
White Cypress	*Callitris glaucophylla*
White Box	*Eucalyptus albens*
Yellow Box	*Eucalyptus melliodora*
Blakely's Red Gum	*Eucalyptus blakelyi*
Tumbledown Red Gum	*Eucalyptus dealbata*
Pilliga Box	*Eucalyptus pilligaensis*
Poplar Box	*Eucalyptus populanea*
Wilga	*Geijera parviflora*
Belah	*Casurina cristata*
Kurrajong	*Brachychiton populneus*
Wattle	*Acacia spp.*
Hopbush	*Dodonaea spp.*
Cassinia	*Cassinia spp.*
Senna	*Senna spp.*
Queensland Red Grass	*Bothriochloa spp.*
Queensland Blue Grass	*Dicathium spp*
Wallaby Grass	*Austrodanthonia spp*
Kangaroo Grass	*Themeda triandra*

7.2.5 Ecosystem and Land Use Sustainability Phase

For the purposes of this Closure MOP the Ecosystem and Land Use Sustainability phase represents those activities required to develop sustainable ecosystems that have characteristics comparable to similar undisturbed vegetation associations in the area prior to mine closure.

All Domains

Activities associated with the ecosystem and land use sustainability phase of rehabilitation are generally ongoing maintenance and 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 and 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 sustainability phase until it can be demonstrated that rehabilitation areas have met all conditions for relinquishment.

Rehabilitation monitoring for the Closure MOP term is discussed in Section 8.

7.3 SUMMARY OF REHABILITATION AREAS DURING THE CLOSURE MOP TERM

Table 25 summarises the rehabilitation status for each domain at the start of the Closure MOP and anticipated status at the end of the Closure MOP period.

Table 25
Summary of Rehabilitation Proposed during the Closure MOP Term

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at the start of the Closure MOP (ha)	Area at the end of the Closure MOP (ha)	Comments
Infrastructure (1)	Rehabilitation areas – Pasture (D)	1D	Active	14	0	By the end of the Closure MOP term, it is anticipated that the entire Infrastructure area will be at the Ecosystem and Land Use Establishment phase.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	14	0	
Infrastructure (1)	Rehabilitation areas – Woodland (E)	1E	Active	5.4	0	By the end of the Closure MOP term, it is anticipated that the entire Infrastructure area will be at the Ecosystem and Land Use Establishment phase.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	5.4	0	
Infrastructure Total:				**19.4**	**0**	
Water Management Area (3)	Water Management Area (B)	3B	Active	9.4	9.4	This domain will remain active during the Closure MOP term, and these water storages would be retained in the post-mining landform.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	9.4	9.4	
Water Management Area (3)	Rehabilitation areas – Woodland (E)	3D	Active	9.3	9.3	These water storages would be decommissioned and rehabilitated during the Closure MOP term.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	9.3	9.3	
Water Management Area (3)	Rehabilitation areas – Pasture (D)	3D	Active	8.7	8.7	These water storages would be decommissioned and rehabilitated during the Closure MOP term.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	8.7	8.7	
Water Management Area Total:				**27.4**	**27.4**	

Table 25 (continued)
Summary of Rehabilitation Proposed during the Closure MOP Term

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at the start of the Closure MOP (ha)	Area at the end of the Closure MOP (ha)	Comments
Overburden Emplacement Area (4)	Rehabilitation areas – Pasture (D)	4D	Active	66.3	0	This domain will be reshaped to the final landform during the Closure MOP term and rehabilitated to Ecosystem and Land Use Establishment phase.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	66.3	0	
Overburden Emplacement Area (4)	Rehabilitation areas – Woodland (E)	4E	Active	50.2	0	This domain will be reshaped to the final landform during the Closure MOP term and rehabilitated to Ecosystem and Land Use Establishment phase.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	50.2	0	
Overburden Emplacement Area Total:				**116.5**	**0**	
Stockpile Area (5)	Rehabilitation areas – Pasture (D)	5D	Active	6.8	0	All soil stockpiles will be used for rehabilitation works during the Closure MOP term. All soil stockpiles will be rehabilitated to Ecosystem and Land Use Establishment phase with Pasture species.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	6.8	0	
Stockpile Area (5)	Rehabilitation areas – Woodland (E)	5E	Active	16.5	0	All soil stockpiles will be used for rehabilitation works during the Closure MOP term. The soil stockpile to the east of the overburden emplacement will be rehabilitated to Ecosystem and Land Use Establishment phase with Woodland species.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	16.5	0	
Soil Stockpile Area Total:				**23.3**	**0**	

Table 25 (continued)
Summary of Rehabilitation Proposed during the Closure MOP Term

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at the start of the Closure MOP (ha)	Area at the end of the Closure MOP (ha)	Comments
Void (Open cut void) (6)	Rehabilitation areas – Pasture (D)	6D	Active	18.0	0	The open cut void will be reshaped to the final landform (i.e. final depression) during the Closure MOP term and rehabilitated to Ecosystem and Land Use Establishment phase to pasture [Domain 6I]).
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	18.0	0	
Void (Open cut void) (6)	Rehabilitation areas – Woodland (E)	6D	Active	3.7	0	The open cut void will be reshaped to the final landform (i.e. final depression) during the Closure MOP term and rehabilitated to Ecosystem and Land Use Establishment phase to pasture [Domain 6I]).
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	3.7	0	
Void (Open Cut Void)/Final Depression Total:				**21.7**	**0**	
Rehabilitation area (7)	Rehabilitation areas – Pasture (D)	7D	Active			Pasture rehabilitation is proposed to be completed to Ecosystem and Land Use Establishment phase on the out-of-pit dump crest. This will require reshaping during the Closure MOP term to achieve the desired final landform.
			Decommissioning			
			Landform Establishment	11.1	0	
			Growth Medium Development			
			Ecosystem Establishment	24.2	139.9	
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	35.3	139.9	
Rehabilitation area (7)	Rehabilitation areas – Woodland (E)	7E	Active			Woodland rehabilitation to Ecosystem and Land Use Establishment phase has been established on the batters of the out-of-pit dump.
			Decommissioning			
			Landform Establishment	36.9	0	
			Growth Medium Development			
			Ecosystem Establishment	91.3	204.6	
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	128.2	204.6	
Rehabilitation Area Total:				**163.6**	**344.5**	

Table 25 (continued)
Summary of Rehabilitation Proposed during the Closure MOP Term

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area at the start of the Closure MOP (ha)	Area at the end of the Closure MOP (ha)	Comments
Undisturbed (8)	Rehabilitation areas – Pasture (D)	8D	Active	0	0	Undisturbed pasture areas within the ML's will retain their existing land use post-mining.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	0	0	
Undisturbed (8)	Rehabilitation areas – Woodland (E)	8E	Active			Undisturbed woodland areas within the ML's will retain their existing land use post-mining.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability			
			Land Relinquishment			
			Total	0	0	
Undisturbed (8)	Conservation Area (J)	8J	Active			Undisturbed areas will be preserved.
			Decommissioning			
			Landform Establishment			
			Growth Medium Development			
			Ecosystem Establishment			
			Ecosystem Sustainability	0.3	0.3	
			Land Relinquishment			
			Total	0.3	0.3	
Undisturbed Total:				**0.3**	**0.3**	
Overall Total				**372.2**	**372.2**	

Note: ML 1624 spatial file was sourced from NSW Government data and the area of the polygon is 231.26 hectares. ML 1624 is listed as 233.9 ha in the formal documentation. All mine site disturbance has been accounted for in calculations and the 2.64 discrepancy between spatial data total area and formal document relates to undisturbed areas.

7.4 RELINQUISHMENT

Whitehaven do not intend to pursue relinquishment of any areas within ML 1620/1662 within the Closure MOP term.

8 REHABILITATION AND CLOSURE MONITORING

8.1 REHABILITATION MONITORING

A multi-scale, multi-data source monitoring approach has been used, incorporating remote sensing to monitor the rehabilitation at Rocglen Mine post closure. Monitoring aims to measure both analogue and impact areas for both grazing and native woodland land uses.

Rehabilitation monitoring reports include:

- remote-sensing based landscape assessment (multi-spectral imagery);
- monitoring of grazing areas (using a combination of pasture attributes);
- native vegetation surveys; and
- terrestrial fauna and habitat surveys.

Specific monitoring objectives include:

- quantitative tracking of rehabilitation performance and progression towards completion criteria;
- assessing key aspects of flora development (upper, mid and lower strata) in woodland areas;
- comparing rehabilitation monitoring data with previous years monitoring data;
- using monitoring data to improve rehabilitation performance by identifying areas requiring maintenance activities or improving monitoring methods.

Results of the rehabilitation monitoring are reported in the Annual Review.

As described in Section 8.2, rehabilitation monitoring results will be used to verify that the rehabilitation completion criteria have been met.

8.1.1 Pasture Areas

Monitoring for Domain D – Rehabilitation Area Pasture will provide quantitative data on key pasture and soil attributes as they relate to land agricultural capability. Pasture species, weed species, biomass, and groundcover composition as well as parameters related to soil erosion and soil nutrient status (pH, EC, OM, N or P, dispersivity) will be assessed as part of an agronomic assessment of pasture areas and grazed analogue areas. Contingency measures to be implemented if required are noted in Table 26.

Groundcover composition will be recorded during surveys of pasture areas for all plots and the percentage cover of weeds, pasture, bare ground and leaf litter will be considered. Records of groundcover composition allow for comparison between rehabilitation areas and analogue sites as well as changes between sampling periods. The number of pasture and weed species present in rehabilitated plots versus control plots at analogue sites will also be recorded and any recommended weed treatments documented in the annual monitoring report.

Biomass (kg/ha) will be measured during surveys of pasture areas, and generally reflect the variations in percentage of pasture cover. Some variation between rehabilitation areas and analogue sites is expected due to varying management practices (i.e. grazing pressure), however changes in biomass between sampling periods at rehabilitation areas will provide an indicator of the pasture areas' carrying capacity and potential for sustainable grazing with management inputs analogous to local grazing operations.

Biomass assessments will be supplemented with grazing trials to quantify the sustainable carrying capacity (DSE equivalent) of rehabilitated pasture areas. It is not expected that the grazing trials will commence within the Closure MOP term given the target rehabilitation phase at the end of MOP period is Ecosystem and Land Use Establishment.

8.1.2 Native Vegetation Monitoring

Vegetation surveys will be undertaken for all Domain E – Rehabilitation Area Woodland, and will focus on the condition, composition and structure of woodland vegetation in rehabilitation areas and analogue sites.

The native vegetation monitoring program provides quantitative data on woodland structure and composition following the Biobanking Assessment Methodology (BBAM) (OEH, 2014), or the latest contemporary methodology, for vegetation monitoring. Surveys of native vegetation areas will be used to detect any changes relative to benchmarks and analogue sites in each strata, specifically:

- overstorey: cover, health, richness, recruitment;
- mid-storey: cover, richness; and
- ground-cover: total percent ground cover, native ground cover (cover and richness), and weeds (percent cover, richness).

During native vegetation monitoring events native and exotic fauna observations, and soil erosion observations, will be recorded.

8.1.3 Terrestrial Fauna and Habitat Monitoring

Terrestrial fauna and habitat monitoring will focus on native vegetation areas and targets:

- Woodland birds, as they are relatively mobile and are often one of the first fauna groups to make use of maturing rehabilitation areas; and
- Reptiles, as specific habitat was established to attract these species. Analysis includes presence/absence, species diversity and use of habitat.

More detailed fauna surveys may be required when vegetation community structure develops and the habitat becomes more complex. Any revision to the scope of the fauna monitoring program will be reported in the Annual Review.

8.2 CLOSURE MONITORING

Numerous environmental monitoring programmes are undertaken at the Rocglen Coal Mine in accordance with PA 10_0015 and its environmental management plans, including air quality, noise, blasting, surface water, groundwater, and rehabilitation monitoring programmes.

Following the cessation of mining and supplementary earthworks some of these monitoring programmes would become redundant and would cease (e.g. blast, air quality and noise monitoring) or would be gradually refined once rehabilitation works have been completed and rehabilitation areas develop/mature (e.g. surface water monitoring). Whitehaven would refine its monitoring programmes in consultation with the relevant government agencies during the Closure MOP term.

It is anticipated that the surface water monitoring programme will be progressively refined during the Closure MOP term to focus on runoff areas from the final landforms and any retained sediment dams/water storages. It is anticipated that the groundwater monitoring programme would cease during the Closure MOP term in consultation with the EPA and relevant regulatory authorities.

Rehabilitation performance monitoring, including terrestrial fauna and habitat monitoring of the rehabilitation areas, would continue throughout the Closure MOP term and results from the rehabilitation monitoring programme would be used to confirm that the rehabilitation completion criteria have been met.

The current rehabilitation monitoring program will be reviewed and updated if required during the first year of the monitoring period.

Weed and feral/pest animal monitoring would also be continued throughout the Closure MOP term to control weed and feral animal/pest presence, and to confirm that the completion criteria relevant to weed and feral/pest animal control have been met.

Following mine closure, rehabilitation monitoring would cease, subject to consultation with relevant stakeholders.

8.3 RESEARCH AND REHABILITATION TRIALS AND USE OF ANALOGUE SITES

8.3.1 Rehabilitation Trials

There are no specific rehabilitation trials or research proposed or undertaken to date at the Rocglen Coal Mine. Rehabilitation monitoring and rehabilitation methodology records are, however, shared among Whitehaven operations to inform decision-making regarding rehabilitation campaigns.

8.3.2 Analogue Sites

Whitehaven undertakes monitoring at appropriate representative sites (known as reference or analogue sites), refer Figure 1, to quantify the key desirable qualities (indicators) of native vegetation, pasture rehabilitation areas, and fauna.

Monitoring at pasture analogue sites will be used to determine benchmarks for indicators including percent pasture cover, total biomass, pasture species composition and weed species presence. Native vegetation analogue site monitoring is used to determine benchmarks for indicators including percent foliar coverage for midstorey and canopy species, species presence and abundance for all strata (groundcover, midstorey and canopy) and weed species presence.

Native vegetation analogue sites will also be monitored as a control (WC01, WC02 and WC03 on Figure 1) to compare utilisation of rehabilitation areas and undisturbed areas by target species. A Gap analysis of rehabilitation monitoring including a review of the Analogue site will be undertaken during the first year of the MOP period, with analogue sites updated if required.

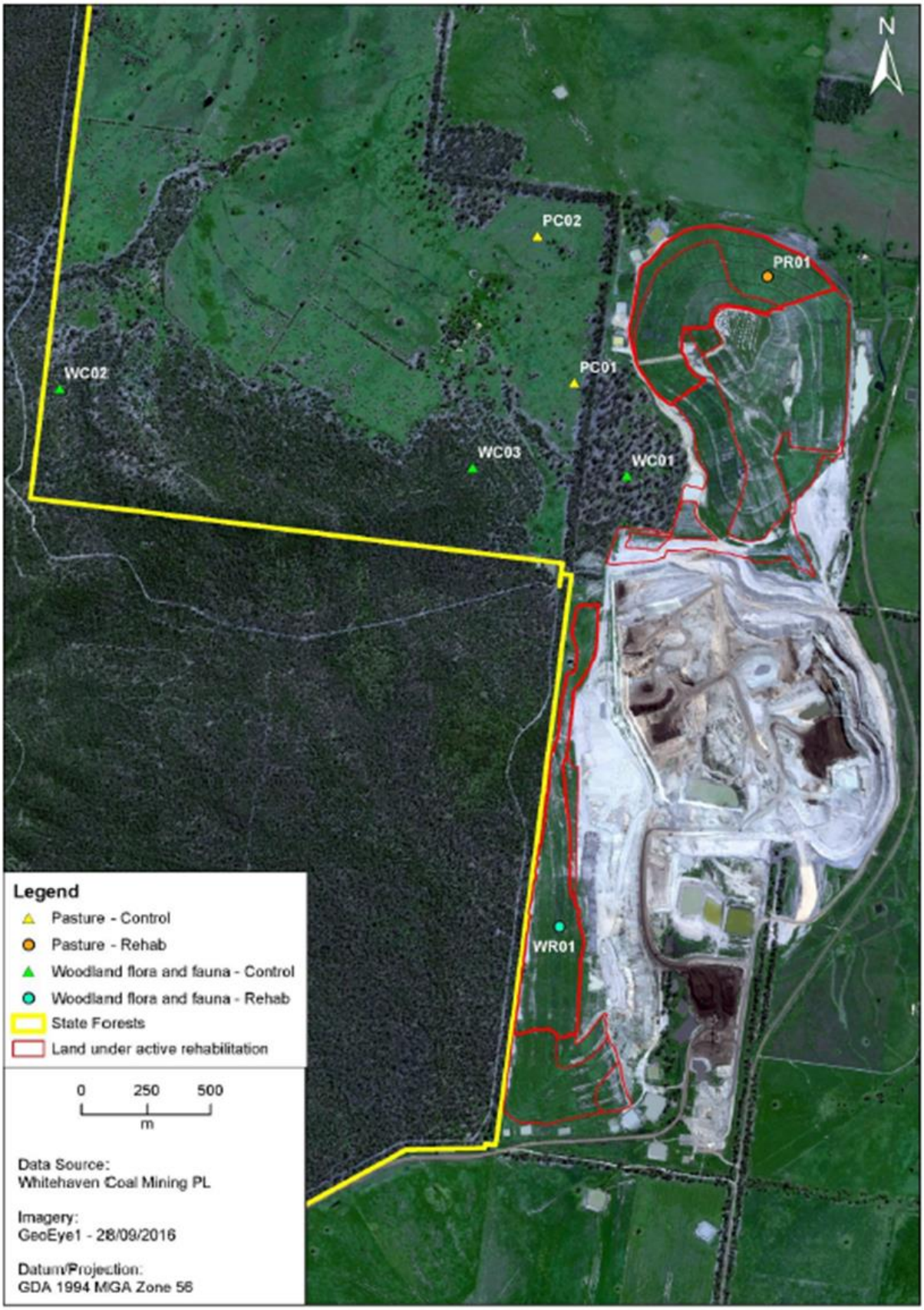


Figure 1: Monitoring locations

9 INTERVENTION AND ADAPTIVE MANAGEMENT

9.1 THREATS TO REHABILITATION AND CLOSURE

Unpredictable events such as bushfires, droughts and floods may present risks to rehabilitation both during the life of mine and post-closure. These events generally have significant consequences for rehabilitation quality and are likely to require adaptive management in order to mitigate risks and achieve relinquishment of affected rehabilitation areas within a satisfactory timeframe.

Although these events may have a high degree of unpredictability, monitoring the status of contributing factors enables an assessment of the likelihood of a major impact to rehabilitation occurring. For example, measuring fuel loads in and adjacent to woodland rehabilitation areas informs a periodic assessment of the likelihood of a bushfire event.

Other major risks to rehabilitation may not present as sudden events, but as an increasing impact over an extended period of time. For example, evolution of regulator or community expectations regarding post-mining land uses may present a risk to achieving relinquishment, or increasing feral pest numbers may increase pressure on native fauna and vegetation communities.

Threats to rehabilitation were identified in the Risk Assessment (Appendix B) and have been discussed in Section 3.2. The key threats (moderate or high risk) are listed in Table 26.

Table 26
Key Threats to Rehabilitation

Threat	Caused by
Acid Mine Drainage	Poor knowledge of material characteristics.
Geotechnical	Geotechnical failure.
Soil Type(s) and Suitability	Inadequate soil availability and/or quality.
Flora	Inadequate revegetation methodology.

Where rehabilitation monitoring indicates that there is a significant threat to rehabilitation, adaptive management in accordance with the Rehabilitation and Closure Trigger Action Response Plan (TARP), described in Section 9.2, will be undertaken.

9.2 REHABILITATION AND CLOSURE TRIGGER ACTION RESPONSE PLAN

This Rehabilitation and Closure TARP has been developed to provide a framework to manage potential key risks to rehabilitation during the Closure MOP term and has been developed based on rehabilitation and closure risks. 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 Review. 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 27, and will be revised as conditions at the Rocglen Coal Mine change or new risks to rehabilitation are identified.

Table 27
Rehabilitation and Closure TARP

Aspect/Category	Key Element	Trigger/Response	1st Level Trigger	2nd Level Trigger
Landform stability	Slope gradient	Trigger	<70% of the rehabilitation area has slopes within the limits stipulated in this Closure MOP.	<55% of the rehabilitation area has slopes within the limits stipulated in this Closure MOP.
		Response	Undertake re-grading and revegetation of the area.	Undertake a review of the landform design, and an assessment of the stability of the landform including material characterisation. Undertake stability enhancement works including revegetation, if required. Consider re-grading to achieve stability.
	Stability	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 or slumping and consider rehandling material and/or regrading if required.
	Erosion control	Trigger	Minor gully or tunnel erosion present and/or minor rilling (up to 300 mm in depth).	Slumping and/or significant gully or tunnel erosion present and/or significant rilling, which is compromising landform stability.
		Response	An inspection of the site will be undertaken by a specialist. Investigate opportunities to install (or augment existing) water management infrastructure to address erosion. Remediate as appropriate.	Engage a specialist to assist with the management of erosion and sedimentation at the site and provide recommendations to appropriately remediate the erosion. Remediate as soon as practicable.
	Free-draining landforms	Trigger	Landforms exhibiting ponding in excess of design.	Landforms exhibiting significant drainage issues, threatening or causing material harm to the environment.
		Response	An inspection of the site will be undertaken by a specialist. Investigate opportunities to address issues. Remediate as appropriate.	Undertake a review of the landform design, including survey if required. Undertake re-grading and re-vegetation of the area.
	Water Management Structures	Trigger	Water management structures (sediment dams, channels, contour banks) exhibit minor erosion and/or scouring.	Water management structures fail or display significant scouring/erosion.
		Response	An inspection of the site will be undertaken by a suitably trained person. Identify remedial actions such as amelioration, re-vegetation or alternative scour protection.	Engage specialist consultant to develop a site specific remediation plan and review water management structure design criteria. Provide for physical works on the basis of design review.
	Spontaneous Combustion	Trigger	Monitoring using infrared imaging indicates areas of heating.	Monitoring indicates visible signs of spontaneous combustion or slight sulphur odour.
		Response	An inspection of the site will be undertaken to assist to identify appropriate remedial measures.	Management of the material with the propensity for spontaneous combustion in accordance with the SCMP.

Table 27 (continued)
Rehabilitation and Closure TARP

Aspect/Category	Key Element	Trigger/Response	1st Level Trigger	2nd Level Trigger
Soil Quality and Volume	Salinity	Trigger	Increasing trend in soil/overburden salinity levels.	Presence of salt scalds.
		Response	Undertake soil/overburden testing to verify EC and recommend further soil/spoil amelioration.	Engage a specialist to develop a site specific management report to be implemented to remediate salinity scalds. Undertake works as required.
	Soil dispersion	Trigger	Increasing trend in soil dispersivity (Emmerson Aggregate Test C [EAT]).	Topsoils are > moderately dispersive.
		Response	Undertake testing to determine required amelioration and undertake amelioration as required.	Review material handling practices. Ameliorate dispersive spoils (for example with coarse gypsum). Re-vegetate if required.
	Soil EC	Trigger	Soil EC greater than 0.6 deciSiemens (dS/m).	Soil EC greater than 1 dS/m.
		Response	Engage a specialist to recommend appropriate measures to reduce soil EC. Undertake consultant recommendations where possible and viable.	Engage a specialist to recommend appropriate measures to reduce soil EC. Undertake consultant recommendations to reduce EC to an appropriate level.
	Soil pH	Trigger	Soil pH > 8 but< 8.5 or < 5 but > 4.5.	Soil pH is < 4.5 or > 8.5.
		Response	Undertake analytical soil testing and evaluation. Where appropriate implement recommendations for amelioration to increase/reduce pH to within rehabilitation guidelines.	Undertake analytical soil testing and evaluation. Where appropriate, implement recommendations for amelioration to bring pH to within rehabilitation guidelines. Undertake evaluation recommendations to achieve soil pH within appropriate range.
	Soil Volume	Trigger	Soil balance indicates potential deficit.	Soil balance identifies deficit
		Response	Undertake continued characterisation of soil type and placement methodology.	Undertake review of potential additional sources/alternate application methods and seek Resource Regulator endorsement of preferred options.
Water Quality	Groundwater	Trigger	Monitoring detects decreasing groundwater depth.	Monitoring detects ongoing trend in decreasing groundwater levels relative to predictions.
		Response	Undertake additional monitoring to identify if there is a decreasing trend that indicates groundwater loss.	Engage specialist to investigate groundwater interaction with final depression and develop remedial actions.
	Discharge water quality	Trigger	Sediment basin discharge exceeds EPL12870 criteria.	Progressive deterioration of discharge water quality to be consistently outside EPL12870 criteria ANZECC water quality guideline limits.
		Response	Repeat sampling to confirm results exceed limits, and investigate potential causes.	Review water management structure maintenance and discharge procedures, and sediment basin capacity requirements.

Table 27 (continued)
Rehabilitation and Closure TARP

Aspect/Category	Key Element	Trigger/Response	1st Level Trigger	2nd Level Trigger
Land Management	Weeds	Trigger	Monitoring indicates the density of weeds in rehabilitation areas exceeds analogue sites in Ecosystem Establishment phase.	Monitoring indicates substantial weed infestation in Ecosystem Establishment phase significantly exceeding analogue sites.
		Response	Undertake weed management to remove/spray introduced weed species. Treatment of infestations as appropriate to the species.	Undertake weed management to remove introduced weed species. Investigate management measures to reduce weeds including additional soil amelioration, establishment and retention of cover crops until weed presence is at acceptable levels. Implement recommendations as appropriate.
	Pest animals	Trigger	Pest animal species are causing damage to rehabilitation.	Continued damage to rehabilitation from pests after tree guards and fencing has been installed.
		Response	Consult with relevant government agencies to recommend and implement appropriate pest animal control campaign.	Liaise with government agencies and consider a culling program in accordance with OEH regulations.
Biodiversity (Native Vegetation Rehabilitation Areas)	Native Species Richness	Trigger	Less than the relevant mean target criteria for the "Time Since Initial Revegetation" (i.e. BVT 226 Year 1 = 1) in Table 16	Less than the relevant minimum target criteria for the "Time Since Initial Revegetation" (i.e. BVT 226 Year 3 = 2) in Table 16.
		Response	Review methods used by revegetation contractor; seed or seedling quality, soil quality or weather conditions since time of revegetation to determine if it is the cause of delayed native species richness.	Engage a suitably qualified person to investigate causes for revegetation failure and recommend remedial actions. Undertake a field survey to identify which species not present in revegetation areas. Re-seed or maintenance planting of revegetation areas with unsatisfactory species richness. Implement appropriate management actions including revising rehabilitation procedures if required.
Biodiversity (Native Vegetation Rehabilitation Areas)	Native Groundcover (Grasses)	Trigger	Less than the relevant mean target criteria for the "Time Since Initial Revegetation" (i.e. BVT 226 Year 1 = 2%) in Table 17.	Less than the relevant minimum target criteria for the "Time Since Initial Revegetation" (i.e. BVT 226 Year 3 = 5%) in Table 17.
		Response	Review methods used by revegetation contractor; seed or seedling quality, soil quality or weather conditions since time of revegetation to determine if it is the cause of delayed native groundcover (grasses).	Engage a suitably qualified person to investigate causes for germination failure and recommend remedial actions. 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. Implement appropriate management actions including revising rehabilitation procedures if required.

Table 27 (continued)
Rehabilitation and Closure TARP

Aspect/Category	Key Element	Trigger/Response	1st Level Trigger	2nd Level Trigger
Pasture areas	Pasture Composition	Trigger	Pasture composition is not consistent with the sewn seed mix and or, analogue sites during the Ecosystem Establishment phase.	Ongoing decline in pasture composition away from analogue site composition during the Ecosystem Establishment phase.
		Response	Investigate the likely causes of unsatisfactory germination and or, growth rates. Re-seed unsatisfactorily covered areas. Review seeding procedures including seasonal mixes, timing and seed rate per hectare.	Undertake analytical soil testing and evaluation. Where appropriate implement recommendations for amelioration. Implement appropriate management actions including revising rehabilitation procedures if required.
	Ground cover percent	Trigger	During Ecosystem Establishment, a minimum of 85% vegetative cover is not present.	During Ecosystem Establishment, vegetative cover (< 85%) continues to decline between monitoring events.
		Response	Investigate the likely causes of unsatisfactory germination and or, growth rates. Re-seed areas with unsatisfactory cover. Review seeding procedures including seasonal mixes, timing and seed rate per hectare.	Undertake analytical soil testing and evaluation, Where appropriate implement recommendations for amelioration. Implement appropriate management actions including revising rehabilitation procedures if required.

10 SOCIO-ECONOMIC EFFECTS

The Rocglen Coal Mine currently has an operational workforce of approximately 34 full time employees and contractors. The workforce is expected to reduce following cessation of coal extraction and supplementary earthworks, and continue to reduce over the Closure MOP term as rehabilitation is completed.

Given the number of Whitehaven operations in the broader region, employees and contractors would be encouraged to seek employment at other ongoing Whitehaven operations.

Whitehaven would continue to work in partnership with the GSC and the local community to anticipate, identify and minimise potential social impacts due to closure of the Rocglen Coal Mine.

11 REPORTING

Results of rehabilitation monitoring will be reported in the Annual Review. The Annual Review will record monitoring results and discuss rehabilitation performance against key performance measures/indicators; compliance with regulatory requirements and Whitehaven commitments. The Annual Review will also discuss identified trends and instances where potential rehabilitation failure has been identified triggering intervention in accordance with a Rehabilitation and Closure TARP.

The Annual Review, along with any independent audits undertaken, will be submitted to relevant government agencies and made publicly available via the Whitehaven website.

12 PLANS

The following plans relevant to this MOP have been prepared in consideration of the Plan requirements in the Closure MOP Guidelines, and provided in Appendix A:

- Plan 1A: Project Locality.
- Plan 1B: Pre-mining Environment Natural Environment.
- Plan 1C: Pre-mining Environment Built Environment.
- Plan 2: Mine Domains at Commencement of MOP.
- Plan 3A: Mining and Rehabilitation Year 1 – April 2020 (End of Coal Extraction).
- Plan 3B: Mining and Rehabilitation Year 2 – April 2021.
- Plan 3C: Mining and Rehabilitation Year 3 – April 2022.
- Plan 4: Final Rehabilitation and Post-Mining Land Use.
- Plan 5: Rehabilitation and Post-Mining Land Use Cross – Sections.

13 REVIEW AND IMPLEMENTATION OF THE CLOSURE MOP

13.1 REVIEW OF THE CLOSURE MOP

Periodic reviews will be conducted to assess the effectiveness of this Closure MOP. This Closure MOP may also be revised due to:

- deficiencies being identified;
- results from the monitoring and review program;
- recommendations resulting from the monitoring and review program;
- changing environmental requirements;
- improvements in knowledge or technology becoming available;
- change in legislation;
- where a risk assessment identifies the requirement to alter the Closure MOP; and
- change in the activities, operations or rehabilitation and closure at the Rocglen Coal Mine.

13.2 IMPLEMENTATION

The Rocglen Coal Mine is managed by the MEM, or equivalent.

Annual inspections (as well as additional opportunistic inspections) would be held with the DP&E Resources Regulator and other relevant regulators.

14 REFERENCES

Australian and New Zealand Environment Conservation Council (2000) A*ustralian Water Quality Guidelines for Fresh and Marine Waters*.

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

Commonwealth of Australia (2016) *Leading Practice Sustainable Development Program for the Mining Industry - Mine Closure.*

Landcom (2004) *Managing Urban Stormwater: Soils and Construction – Volume 1 4th Ed.*

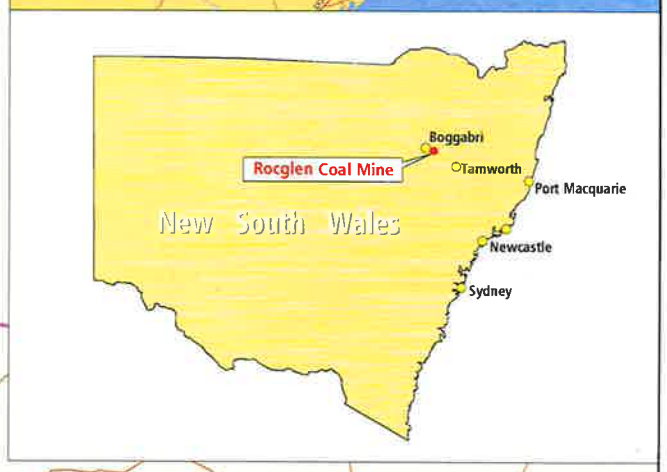
New South Wales Trade Investment Division of Resources and Energy (2013) *ESG3: Mining Operations Plan (MOP) Guidelines.*

Whitehaven Coal Limited (2018a) *Whitehaven Coal Manual – Closure Planning.*

Whitehaven Coal Limited (2018b) *Whitehaven Coal Environmental Standard – Closure.*

APPENDIX A

CLOSURE MOP PLANS



CL 375

Maules Creek Coal Mine

LEARD STATE FOREST

Boggabri Coal Mine

CL 368

Merriown Mountain

ML 1685

Goonbri Mountain

EL 7435

ML 1693

ML 1579

ML 1693

Tarrawonga Coal Mine

Goonbri Road

ML 1693

Boggabri - Manilla Road

EL 5967

Boggabri - Manilla Road

Bluevale Road

BOGGABRI

NARRABRI SHIRE COUNCIL

Bluevale Road

"The Retreat"

"Penryn"

"Roseglass"

Mount Surprise

"Costa Vale"

NAMOI

Kamilaroi Highway

ML 1471

Canyon Coal Mine (under closure)

VICKERY STATE FOREST

"Yarrawonga"

"Glenrock"

ML 1662

ML 1620

"Yarran"

"Belah"

KELVIN STATE FOREST

RIVER

Vickery Coal Project

Bluevale Road

CL 316

Rocglen Coal Mine

Shannon Harbour Road

"Stratford"

"Roseberry"

"Surrey"

"Carlton"

Kelvin Road

Bald Hill

Werris Creek Mungindi Railway

Blue Vale Road

GUNNEDAH SHIRE COUNCIL

Whitehaven Coal Handling and Preparation Plant

Sunnyside Coal Mine (under Care and Mainentance)

ML 1624

Oxley Highway

GUNNEDAH

LEGEND

- Road
- Railway
- Watercourse
- Land Subject to Inundation
- Local Government Area boundary
- Mining Lease boundary (ML / CL)
- Exploration Licence boundary (EL)
- Project Site Boundary
- Non-project related residence
- Project related residence
- Coal Transport Route

I, Mi SPARKES, the General Manager certify that the information on this plan is a true depiction of the proposed development

General Manager

22/2/19

Date

Date	30/11/2016
Drawn	LH
Scale	1:50000
Coordinate System	MGA_ZONE56
Sheet Size	A0

N

0 1.25 2.5km

WHITEHAVEN COAL

Prepared by SLR Consulting

Whitehaven Coal Limited

ROCGLEN COAL MINE - CLOSURE MOP

Project Locality

PLAN 1A

238 000 mE
239 000 mE
240 000 mE
241 000 mE
6 596 000 mN
6 595 000 mN
6 594 000 mN
6 593 000 mN
6 592 000 mN
Driggle Draggle Creek
ML 1662
ML 1620
Jaeger Road
Wean Road
Riordan Road
VICKERY STATE FOREST

LEGEND:

- Project Site Boundary
- Mining Lease Boundary
- Watercourse
- Contour (5m)
- NSW State Forest

Vegetation Communities

- Narrow-leaf Ironbark - Pilliga Grey Box Community
- Poplar Box Grassy Woodland
- Pilliga Grey Box - White Cypress Pine Community
- Pilliga Grey Box - Whitebox - Yellowbox - White Cypress Pine Community
- Brigalow Community
- Cleared Lands - Used for Grazing and / or Cultivation
- Whitehaven Regional Biobank Site

Notes

Pre-mining base contours supplied by Whitehaven Coal.
Base photo source: Geo-spectrum (Australia) Pty Ltd dated 21 Nov 2001

I, M. SEARLE, the General Manager, certify that the information on this plan is a true indication of the proposed development

General Manager — Date 22/2/19

Date	30/11/2018
Drawn	LH
Scale	1:5000
Coordinate System	MGA_ZONE56
Sheet Size	A0

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0 125 250m

WHITEHAVEN COAL

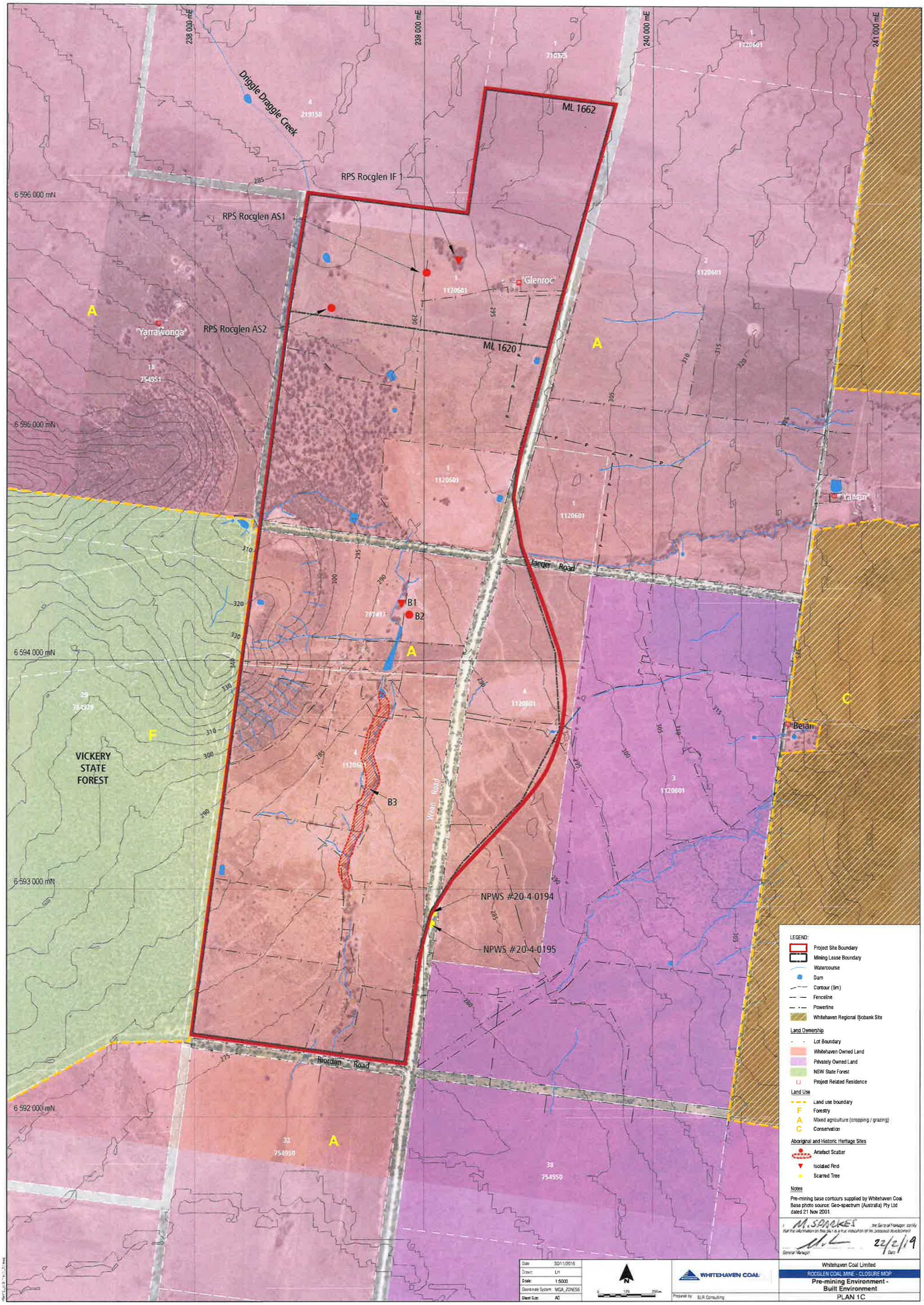
Prepared by SLR Consulting

Whitehaven Coal Limited

ROCGLEN COAL MINE - CLOSURE MOP

Pre-mining Environment - Natural Environment

PLAN 1B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239 000 mE
240 000 mE
241 000 mE
Driggle Draggle Creek
ML 1662
RPS Rocglen IF 1
RPS Rocglen AS1
RPS Rocglen AS2
ML 1620
"Glenroc"
"Yarrawonga"
"Yabaan"
"Belah"
Jaeger Road
Wren Road
Riordan Road
B1
B2
B3
NPWS #20-4-0194
NPWS #20-4-0195
VICKERY STATE FOREST
6 596 000 mN
6 595 000 mN
6 594 000 mN
6 593 000 mN
6 592 000 mN
LEGEND:
Project Site Boundary
Mining Lease Boundary
Watercourse
Dam
Contour (5m)
Fenceline
Powerline
Whitehaven Regional Biobank Site
Land Ownership
Lot Boundary
Whitehaven Owned Land
Privately Owned Land
NSW State Forest
Project Related Residence
Land Use
Land use boundary
F Forestry
A Mixed agriculture (cropping / grazing)
C Conservation
Aboriginal and Historic Heritage Sites
Artefact Scatter
Isolated Find
Scarred Tree
Notes
Pre-mining base contours supplied by Whitehaven Coal
Base photo source: Geo-spectrum (Australia) Pty Ltd dated 21 Nov 2001
I M. SPARKES the General Manager, certify that the information on this plan is a true indication of the proposed development
General Manager
22/2/19
Date
Date: 30/11/2016
Drawn: LH
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WHITEHAVEN COAL
Prepared by SLR Consulting
Whitehaven Coal Limited
ROCGLEN COAL MINE - CLOSURE MOP
Pre-mining Environment - Built Environment
PLAN 1C

238 000 mE
239 000 mE
240 000 mE
241 000 mE
6 596 000 mN
6 594 000 mN
6 592 000 mN
Driggle Draggle Creek
ML 1662
ML 1620
A
A1
B
B1
C
C1
LEGEND:
Project Site Boundary
Mining Lease Boundary
Disturbance Boundary
Watercourse
Dam
Contour (5m)
Lot Boundary
Fenceline
Powerline
Whitehaven Regional Biobank Site
Wildlife Corridor
Cross Section Location (Refer Plan 5)
Primary Domains
Domain 1 - Infrastructure
Domain 3 - Water Management Area
Domain 4 - Overburden Emplacement Area
Domain 5 - Stockpiled Material
Domain 6 - Void (Open Cut Void)
Domain 7 - Rehabilitation Area
Domain 8 - Undisturbed Area
Secondary Domains
Domain A - Infrastructure
Domain B - Water Management Area
Domain D - Rehabilitation Area - Pasture
Domain E - Rehabilitation Area - Woodland
Domain I - Final Depression
Domain J - Conservation Area
Rehabilitation Phases
Landform Establishment
Ecosystem and Land Use Establishment
Notes
Base contours supplied by Whitehaven Coal.
Base photo supplied by Whitehaven Coal (dated March 2018) & Google Earth for surrounding area coverage.
I, M. SPARKES, the General Manager, certify that the information on this plan is a true indication of the proposed development
General Manager
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WHITEHAVEN COAL
Prepared by WHC Gunnedah Survey/Resource Strategies
Whitehaven Coal Limited
ROCGLEN COAL MINE - MINE OPERATIONS PLAN
Mine Domains at Commencement of MOP
PLAN 2

238 000 mE
239 000 mE
240 000 mE
241 000 mE
6 596 000 mN
6 594 000 mN
6 592 000 mN
Driggle Draggle Creek
ML 1662
ML 1610
Wilkinson Road
Wilkinson Road
Ukolan Road
4
219158
1
710525
1
1120601
2
1120601
3
1120601
4
1120601
16
754951
29
754929
32
754950
38
754950

LEGEND:

- Project Site Boundary
- Mining Lease Boundary
- Disturbance Boundary
- Watercourse
- Dam
- Contour (5m)
- Lot Boundary
- Fenceline
- Powerline
- Whitehaven Regional Biobank Site
- Wildlife Corridor

Primary Domains

- Domain 1 - Infrastructure
- Domain 3 - Water Management Area
- Domain 4 - Overburden Emplacement Area
- Domain 5 - Stockpiled Material
- Domain 6 - Void (Open Cut Void)
- Domain 7 - Rehabilitation Area
- Domain 8 - Undisturbed Area

Secondary Domains

- Domain A - Infrastructure
- Domain B - Water Management Area
- Domain D - Rehabilitation Area - Pasture
- Domain E - Rehabilitation Area - Woodland
- Domain I - Final Depression
- Domain J - Conservation Area

Rehabilitation Phases

- Landform Establishment
- Ecosystem and Land Use Establishment

Notes

Base contours supplied by Whitehaven Coal.
Base photo supplied by Whitehaven Coal (dated March 2018) & Google Earth for surrounding area coverage.

I, M. SPANGER, the General Manager, certify that the information on this plan is a true implication of the proposed development

M S — 22/2/19

General Manager — Date

Date	22-02-19
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Scale	1:5000
Coordinate System	MGA_ZONE56
Sheet Size	A0

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WHITEHAVEN COAL

Prepared by WHC Gunnedah Survey/Resource Strategies

Whitehaven Coal Limited

ROCGLEN COAL MINE - MINE OPERATIONS PLAN

Mine and Rehabilitation Year 1 - April 2020 (End of Coal Extraction)

PLAN 3A

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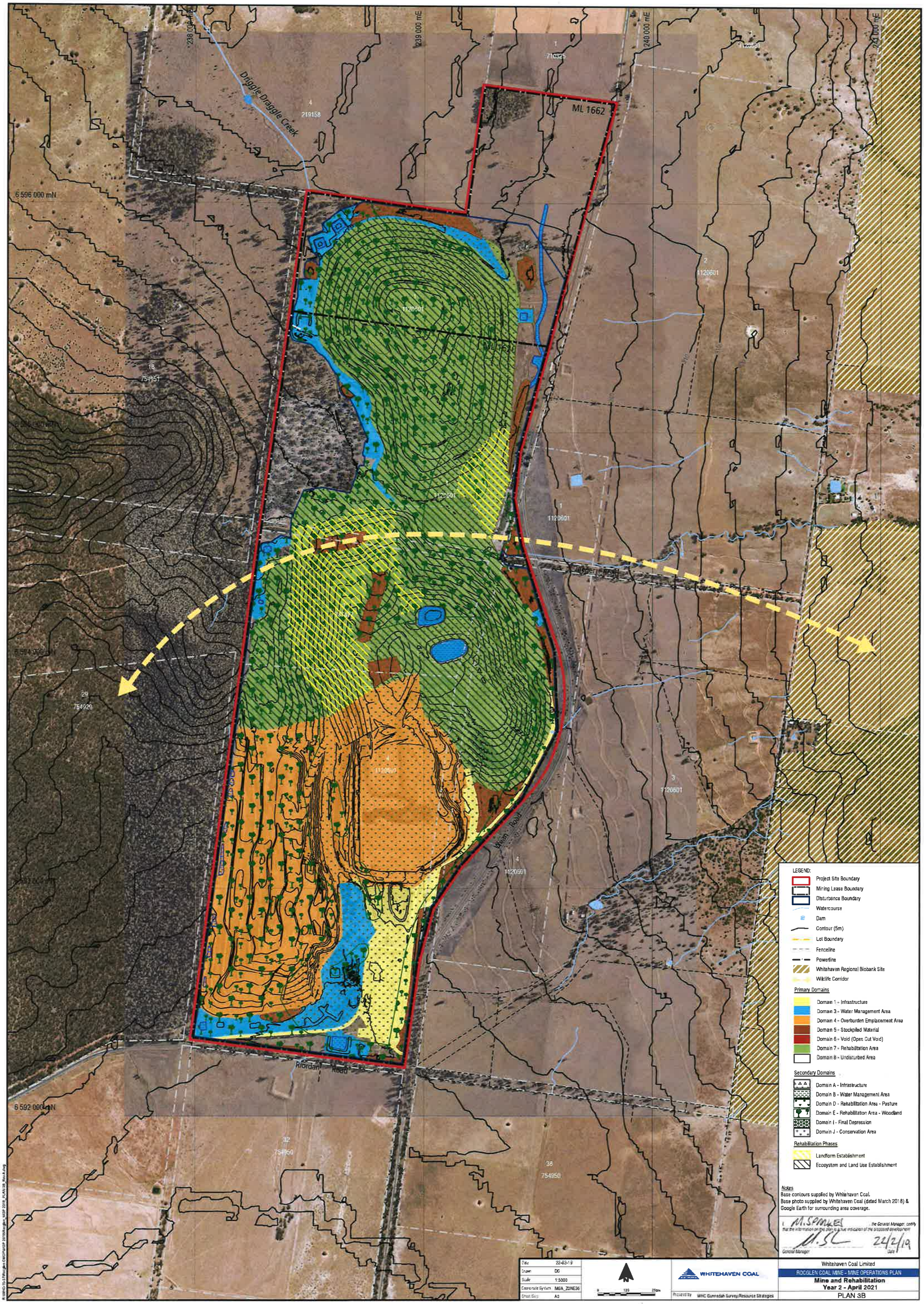
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6 596 000 mN
6 594 000 mN
6 592 000 mN
Driggle Draggle Creek
ML 1662
Riordan Road
Wilson Road
LEGEND:
Project Site Boundary
Mining Lease Boundary
Disturbance Boundary
Watercourse
Dam
Contour (5m)
Lot Boundary
Fenceline
Powerline
Whitehaven Regional Biobank Site
Wildlife Corridor
Primary Domains
Domain 1 - Infrastructure
Domain 3 - Water Management Area
Domain 4 - Overburden Emplacement Area
Domain 5 - Stockpiled Material
Domain 6 - Void (Open Cut Void)
Domain 7 - Rehabilitation Area
Domain 8 - Undisturbed Area
Secondary Domains
Domain A - Infrastructure
Domain B - Water Management Area
Domain D - Rehabilitation Area - Pasture
Domain E - Rehabilitation Area - Woodland
Domain I - Final Depression
Domain J - Conservation Area
Rehabilitation Phases
Landform Establishment
Ecosystem and Land Use Establishment
Notes
Base contours supplied by Whitehaven Coal.
Base photo supplied by Whitehaven Coal (dated March 2018) & Google Earth for surrounding area coverage.
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General Manager
22/2/19
Date
Date 22-02-19
Drawn DC
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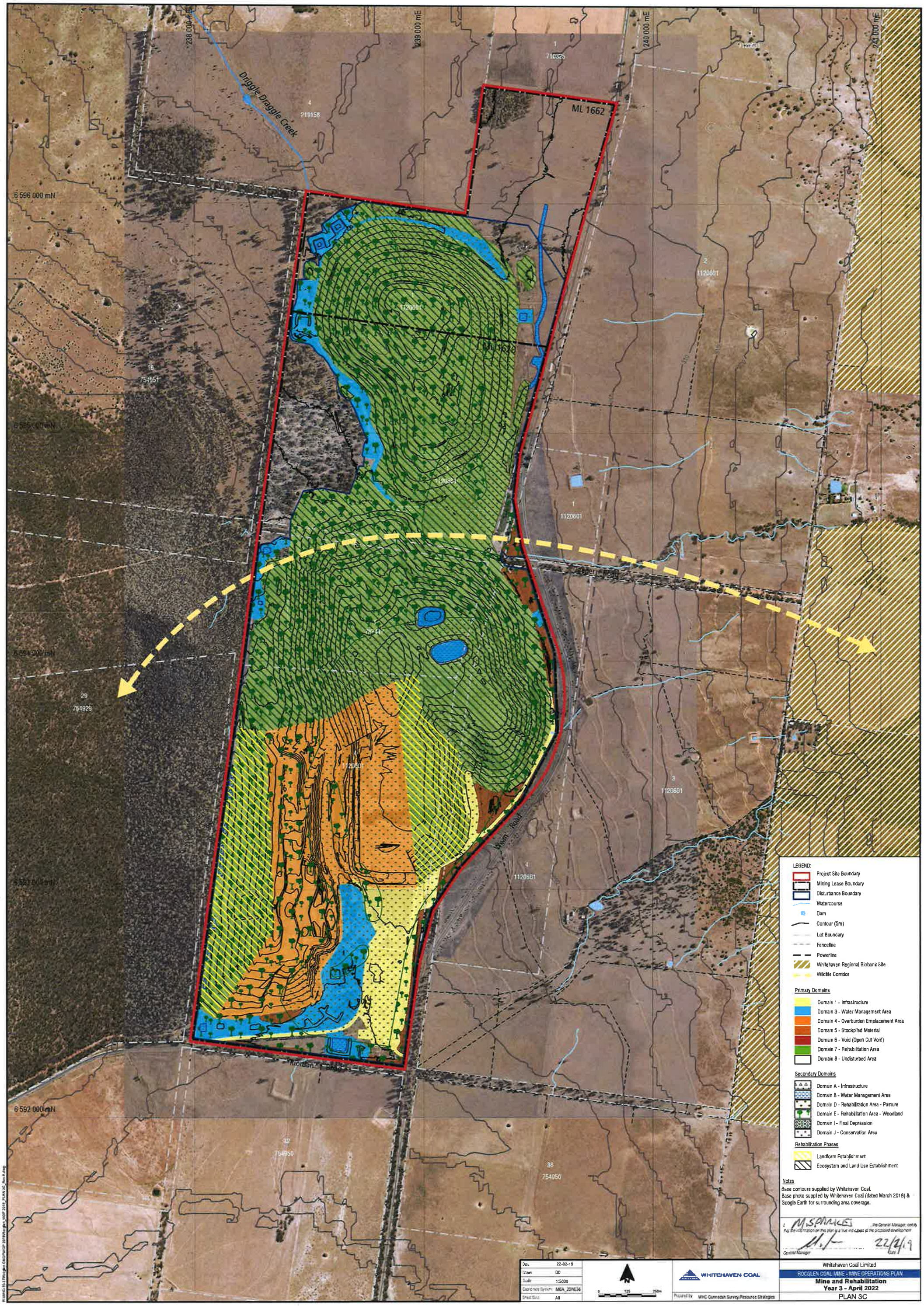
Coordinate System MGA_ZONE56
Sheet Size A0
WHITEHAVEN COAL
Prepared by WHC Gunnedah Survey/Resource Strategies
Whitehaven Coal Limited
ROCGLEN COAL MINE - MINE OPERATIONS PLAN
Mine and Rehabilitation
Year 2 - April 2021
PLAN 3B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6 596 000 mN
6 594 000 mN
6 592 000 mN
Driggle Draggle Creek
ML 1662
ML 1620
Steam Road
Klondyke Road
4
219158
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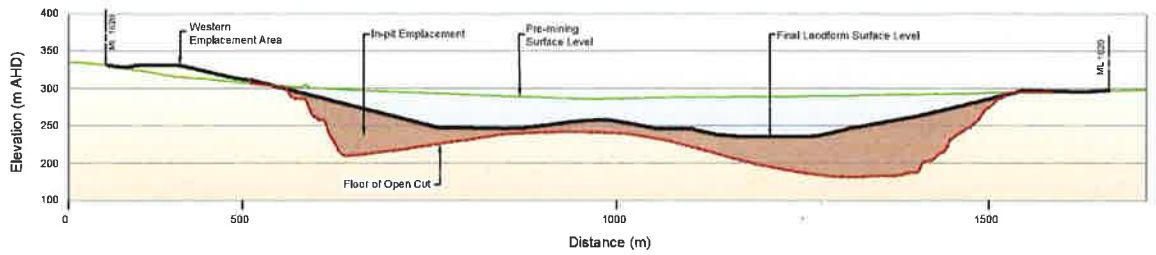
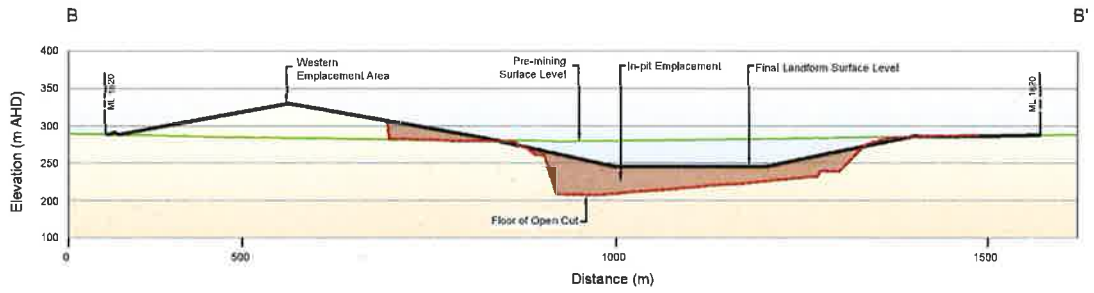
710325
1
1120601
2
1120601
3
1120601
4
1120601
18
754851
29
754929
32
754950
38
754950
LEGEND:
Project Site Boundary
Mining Lease Boundary
Disturbance Boundary
Watercourse
Dam
Contour (5m)
Lot Boundary
Fenceline
Powerline
Whitehaven Regional Biobank Site
Wildlife Corridor
Primary Domains
Domain 1 - Infrastructure
Domain 3 - Water Management Area
Domain 4 - Overburden Emplacement Area
Domain 5 - Stockpiled Material
Domain 6 - Void (Open Cut Void)
Domain 7 - Rehabilitation Area
Domain 8 - Undisturbed Area
Secondary Domains
Domain A - Infrastructure
Domain B - Water Management Area
Domain D - Rehabilitation Area - Pasture
Domain E - Rehabilitation Area - Woodland
Domain I - Final Depression
Domain J - Conservation Area
Rehabilitation Phases
Landform Establishment
Ecosystem and Land Use Establishment
Notes
Base contours supplied by Whitehaven Coal.
Base photo supplied by Whitehaven Coal (dated March 2018) & Google Earth for surrounding area coverage.
I, M.S. PRINCE, the General Manager, certify that the information on this plan is a true indication of the proposed development
General Manager
22/2/19
Date
Date 22-02-19
Drawn DC
Scale 1:5000
Coordinate System MGA_ZONE56
Sheet Size A0
0 125 250m
WHITEHAVEN COAL
Prepared by WHC Gunnedah Survey/Resource Strategies
Whitehaven Coal Limited
ROCGLEN COAL MINE - MINE OPERATIONS PLAN
Mine and Rehabilitation
Year 3 - April 2022
PLAN 3C

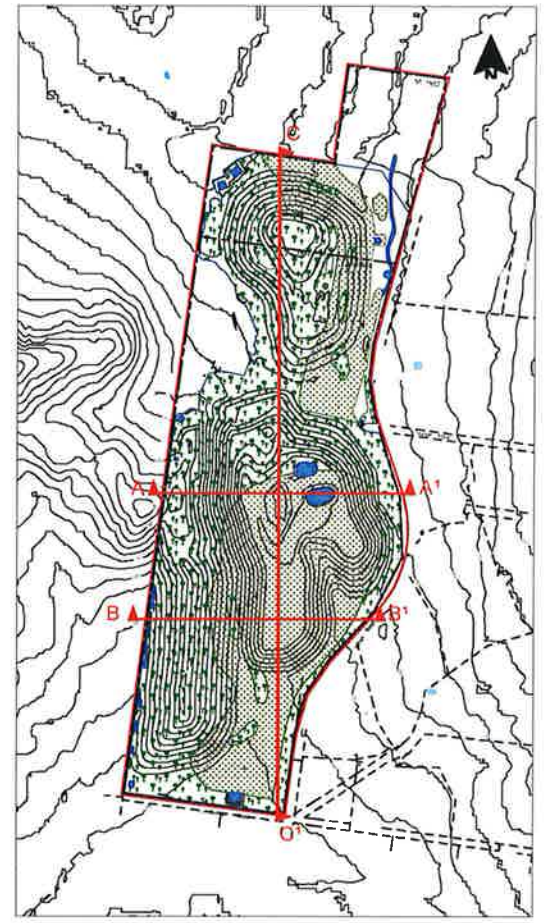
238 000 mE
239 000 mE
240 000 mE
241 000 mE
6 596 000 mN
6 595 000 mN
6 594 000 mN
6 593 000 mN
6 592 000 mN
Driggle Draggle Creek
ML 1662
ML 1618
Jaegers Road
Wean Road
Riordan Road
LEGEND:
Project Site Boundary
Mining Lease Boundary
Disturbance Boundary
Watercourse
Dam
Contour (5m)
Lot Boundary
Fenceline
Powerline
Whitehaven Regional Biobank Site
Wildlife Corridor
Secondary Domains
Domain A - Infrastructure
Domain B - Water Management Area
Domain D - Rehabilitation Area - Pasture
Domain E - Rehabilitation Area - Woodland
Domain I - Final Depression
Domain J - Conservation Area
Notes
Base contours supplied by Whitehaven Coal.
Final Landform based on End of Mine 2020 contours provided by Whitehaven
I, M. SPARKES the General Manager, certify that the information on this plan is a true reflection of the proposed development
General Manager
22/2/19
Date
22-02-19
DG
1:5000
MGA_ZONE56
A0
0 125 250m
WHITEHAVEN COAL
Prepared by WHC Gunnedah Survey/Resource Strategies
Whitehaven Coal Limited
ROCGLEN COAL MINE - MINE OPERATIONS PLAN
Final Rehabilitation and Post Mining Land Use
PLAN 4



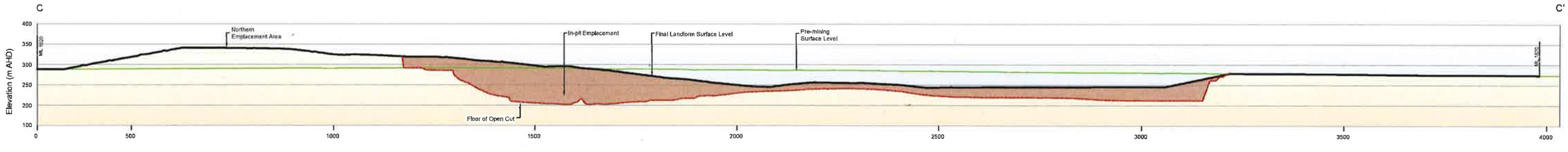
SECTION A - A'



SECTION B - B'



PLAN
Post-mining Landform and Land Use
(Showing Section Locations)



SECTION C - C'

LEGEND:
- Project Site Boundary (offset for clarity)
- Mining Lease boundary
- Overburden Emplacement Area
- Undisturbed Material
- Natural Surface
- Final Landform
- Floor of Open Cut

I, M. SPARKES, Pit Mine Manager, certify that the information on this plan is a true and correct representation of the proposed development.

22/2/19

Mine Manager Date

Date	22-02-19
Scale	1:6000 @ A1 / 1:12000 @ A0
Coordinate System	MGA ZONE 56
Sheet Size	A0
Model: MOP 2015_PLAN 5_Sec Adeq	

0 100 200 m

WHITEHAVEN COAL

Prepared by Resource Strategies

Whitehaven Coal Limited

SUNNYSIDE COAL MINE - MINING OPERATIONS PLAN

Rehabilitation and Post Mining Land use Cross - Sections

PLAN 5

APPENDIX B

RISK REGISTER

Rocglen Coal Mine

Key Element	Issue	Caused By	Consequence	Current Controls (are in place)	Risk Control Effectiveness	Primary Consequence Category	Expected Risk Consequence	Risk Likelihood	Current Risk Rating
Surface Water	Impact to surface water.	Sediment laden water leaving site. Water quality not with EPL criteria. Diverting water around and within the site.	Impact on water quality and quantity. Water retained on site.	Site Water Management Plan. Minimising water retention through separation of clean and dirty water. Minimising water retention at the site.	Satisfactory	Legal and Compliance	2	D	**L**
Groundwater	Impact to rehab from groundwater	Use of pre-existing underground mine workings as a source or storage for water.	Impact on water quality and quantity.	Backfilling final depression to a level above the predicted groundwater recovery level.	Satisfactory	Environment	2	D	**L**
Erosion and Sediment Control	Erosion and sediment on disturbed areas. Uncontrolled discharge offsite of sediment laden water.	Failure to manage rehabilitation areas. Failure of existing water management system and/or design.	Impact on rehabilitation. Pollution.	Erosion and Sediment Control Plan (part of Water Management Plan).	Satisfactory	Environment	2	D	**L**
Acid Mine Drainage	Failure to achieve the rehabilitation outcome prescribed in the MOP.	Poor knowledge of material characteristics.	Inability to reach closure and relinquishment of the lease. Requirement to treat water long-term. Impact on environment.	Material characterisation has been undertaken and determined minimal propensity for generation of AMD.	Satisfactory	Financial	4	D	**M**
Spontaneous Combustion	Spontaneous combustion impedes rehabilitation.	Poor management of materials with propensity for spontaneous combustion.	Inability to complete rehab. Impact on established rehab. Cost of managing spontaneous combustion outbreak.	MOP. Selective handling of carbonaceous material. Regular inspections. Training.	Satisfactory	Financial	2	D	**L**
Geotechnical Stability and Slope Management	Failure of final landform.	Geotechnical failure.	Inability to reach closure and relinquishment of the lease. Additional costs for rework. Safety concerns.	Engineering landform design. Geotechnical review. Inspections.	Satisfactory	Financial	4	D	**M**
Soil Type(s) and Suitability	Inadequate type and/or quality of soil to achieve the rehabilitation outcome prescribed in the MOP.	Inadequate soil available. No additional stripping opportunities due to full disturbance footprint.	Inability to reach closure and relinquishment of the lease. Cost of sourcing ameliorants and alternates.	Soil mass balance estimate has been completed. Soil quality assessment has been completed. Ongoing assessment program of stockpiled material.	Satisfactory	Financial	2	C	**M**
Flora	Failure to achieve the rehabilitation outcome prescribed in the MOP.	Inadequate revegetation methodology. Not considering requirements in rehabilitation planning (correct species). Failure to manage weeds.	Inability to reach performance and/or completion criteria. Inability to reach closure and relinquish lease.	Closure MOP – revegetation methodology. Closure MOP – monitoring against performance and completion criteria. Closure MOP – TARP for revegetation	Satisfactory	Legal and Compliance	2	C	**M**
Fauna	Failure to achieve the rehabilitation outcome prescribed in the MOP.	Failure to manage pests.	Inability to reach closure and relinquish lease.	Closure MOP.	Satisfactory	Legal and Compliance	2	D	**L**
Bushfire	Damage to rehabilitation.	Bushfire.	Loss of established rehabilitation. Additional costs for rework of rehabilitation. Exposed areas (erosion, sediment, dust).	Firebreak establishment and maintenance. Engagement with Rural Fire Service.	Satisfactory	Financial	2	D	**L**
Contaminated Land	Contaminated land occurring at the Rocglen Coal Mine at closure.	Long-term use of the site, spills, leaks etc.	Impact on environment. Constraint for future land use.	Closure MOP.	Satisfactory	Environment	2	D	**L**

APPENDIX C

INDICATIVE TIMELINE AND ASSET REGISTER OF REHABILITATION AND DECOMMISSIONING ACTIVITIES

End of Year 1 (April 2020)	End of Year 2 (April 2021)	End of Year 3 (April 2022)	End of Year 4 (April 2023)	End of Year 7 (April 2026)
• Coal extraction ceases. • Ongoing rehabilitation of in-pit and out-of-pit emplacement batters. • Decommissioning of exploration boreholes.	• Ongoing rehabilitation of in-pit and out-of-pit emplacement batters.	• All carbonaceous material from re-handled overburden and infrastructure area transferred to in-pit emplacement and capped. • Decommissioning of infrastructure commenced (e.g. coal handling infrastructure that is no longer required). • Rehabilitation of in-pit and reshaped out-of-pit emplacement.	• Final in pit and out-of-pit emplacement rehabilitation and ongoing maintenance rehabilitation of mine site. • Supplementary earthworks completed. • Disconnection and termination of services (e.g. water and electricity). • Demolition and removal of site office and facilities, weighbridge, any remaining coal handling infrastructure, pads and footings and carpark commenced. • Decommissioning of internal access roads/tracks that are no longer required. • On-site remediation of contaminated areas commenced (if necessary). • Decommissioning of water dams that are not being retained as part of the final landform.	• Final landform is geotechnically stable, safe and non-polluting. • Rehabilitation to Ecosystem and Land Use Establishment established across all relevant areas of the mining lease. • Decommissioning of any residual infrastructure not being retained, and on-site remediation of any remaining contaminated areas. • Ongoing rehabilitation, monitoring and management.

Domain	Asset ID Number	Description	Management into Perpetuity
Domain 1A – Infrastructure	1	Access Road	Retained
	2	Helipad	Removal End of Year 4
	3	Car Park	Removal End of Year 4
	4	Administration Building	Removal End of Year 4
	5	Ablution Building	Removal End of Year 4
	6	Underground Electricity	Removal End of Year 4
	7	Workshop Building	Removal End of Year 4
	8	Laydown Area	Removal End of Year 4
	9	ROM Hopper & Conveyor	Removal End of Year 4
	10	Load Out Bin	Removal End of Year 4
	11	Weighbridge	Removal End of Year 4
	12	Underground Telstra Line	Removal End of Year 4
	13	Septic Tank	Removal End of Year 4
	14	Production Bore Pump/Cage/Pipes	Retained
	15	Signage & Wind Socks	Removal End of Year 4
Domain 3 – Water Management Area	16	Stand Pipes	Removal End of Year 4
	17	Crushing Plant/Crusher Dam Water Pump/Pipes	Removal End of Year 4
	18	In-pit Dams (VWD1 & VWD2 – Refer to Water Management Plan Figure 3)	Retained
	19	Sediment Basins (SB4, SB5, SB6, SB7, SB8, SB12, SB13, SB14, SB15, SB15A, SB16, SB17, SB20, A, A1, A2, B1, C, C1– Refer to Water Management Plan Figure 3)	Removal End of Year 4 (other dams to be retained – refer Plan 4)
	20	Storage Dams (SD3, Crusher Dams, Dam B – Refer to Water Management Plan Figure 3)	Removal End of Year 3 (other dams to be retained – refer Plan 4)
	21	Signage	Removal End of Year 4
Domain 4 – Overburden Emplacement Area	22	Two-way Communication Tower	Removal End of Year 4
	23	Signage	Removal End of Year 4
Domain 5 – Stockpiled Material	24	Sediment Fencing	Removal End of Year 4
Domain 6 – Open Cut Void	25	Signage	Removal End of Year 4
Domain 8 – Undisturbed Land	26	Farmhouse	Removal End of Year 4
	27	Boreholes (MP07, MP08, Production Bore & WB03 – Refer to Water Management Plan Figure 5)	Removal End of Year 7
	28	Signage	Removal End of Year 3

APPENDIX D

Regulator letter (Ref:_EAMSG0002117) and Response table

NSW GOVERNMENT

Resources Regulator

FORM FRM-222-3 v1.2

Our ref: EAMSG0002117
LETT0003713

Whitehaven Coal Mining Limited
PO Box 600
GUNNEDAH NSW 2380
Attn: Daryl Robinson

Dear Daryl Robinson

ML 1620 (1992), ML 1662 (1992), Whitehaven Coal Mining Limited
Request for Additional Information
Mining Operations Plan

I refer to your Mining Operations Plan for RocGlen Open Cut Coal Mine which was received by the Resources Regulator within the NSW Department of Planning, Industry & Environment (Resources Regulator) on 22 February 2019 (Department Reference: EAMSG0002117).

The assessment has identified that further information is required.

Required Information:

1. A 2019 Rehabilitation Report undertaken by Aspect Ecology for Rocglen Coal Mine was submitted to the Department on 29/11/2019. Include this report in a revised Closure Mining Operation Plan and detail how Rocglen Coal Mine proposes to address Section 4. *Finding and Discussions* and Section 5. *Proposed Measures or Actions* tabled in the 2019 Rehabilitation Report.
2. During the site inspection to Rocglen Coal Mine on 18/12/2019 it was discussed with Whitehaven Coal representatives that mine closure land-form on Rocglen Coal Mine was now working towards a new final land-form design using Geofluv. Any new methodology and final land-form design is required to be included in the Closure MOP. Please advise if a new land-form closure methodology is being applied and update the Closure MOP for review accordingly.

You are required to submit a revised Mining Operations Plan which addresses the Required Information to the Resources Regulator (at email: nswresourcesregulator@service-now.com) by **5 March 2020**.

In accordance with the Department's Service Delivery Standards, this request for further information has "stopped the clock" on the processing of this application.

Assessment will recommence once a revised Mining Operations Plan, which includes the Required Information, is provided to the Resources Regulator. If this is not received by the due date listed above, the Mining Operations Plan may be refused.

If you require additional information, please contact the Resources Regulator on 1300 814 609 (Option 2, then 5), or via email at nswresourcesregulator@service-now.com.

Yours sincerely,

Mark Buchan
Snr Inspector Environment
Mining Act Inspectorate
Resources Regulator
NSW Department of Planning, Industry & Environment

5 February 2020

Table 1 Response to comments from Request for additional information letter (Ref: EAMSG0002117)

Required Information		Request	Response to Comment	MOP Section updated
1 Rehabilitation Report	a) Section 4 finding and discussion	A 2019 Rehabilitation Report undertaken by Aspect Ecology for Rocglen Coal Mine was submitted to the Department on 29/11/2019. Include the report in a revised Closure Mining Operation Plan and detail how Rocglen Coal Mine proposes to address Section 4. Finding and Discussions	Noted. The proposed measure or action table in section 5 of the Rehabilitation report details what works is required to address the rehabilitation themes identified in the findings and discussion section. These themes are addressed in 1b below.	NA
	b) Section 5 Proposed Measures or Actions tabled in the 2019 Rehabilitation Report	Section 5. Proposed Measures or Actions tabled in the 2019 Rehabilitation Report.	8.3.2 Updated 3rd paragraph to address item 5: A Gap analysis of rehabilitation monitoring including a review of the Analogue site will be undertaken during the first year of the MOP period, with analogue sites updated if required.	4.3.2 include Action table 8.2 8.3.2
2	Rocglen Landform	During the site inspection to Rocglen Coal Mine on 18/12/2019 it was discussed with Whitehaven Coal representatives that mine closure land-form on Rocglen Coal Mine was now working towards a new final land-form design using Geofluv. Any new methodology and final land-form design is required to be included in the Closure MOP. Please advise if a new land-form closure methodology is being applied and update the Closure MOP for review accordingly.	Whitehaven had not have made any changes to the landform design as summited in the CMOP.	NA