NARRABRI MINE

EXTRACTION PLAN

LANDSCAPE MANAGEMENT PLAN

PANELS 201 - 202

Prepared by:

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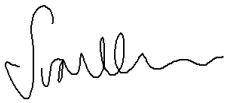
Senior Environmental Manager	S. van der Meulen Onward Consulting		30 March 2022
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Document review history

In accordance with Project Approval Schedule 6 Condition 3, this document has been reviewed as follows:

Review Date	Reason for review	Reviewed by	Revision required (Y/N)

Acronyms and abbreviations

Acronym	Description
BCS	The Biodiversity Conservation and Science Directorate within DPE
CHPP	Coal Handling and Preparation Plant
DGS	Ditton Geotechnical Services
DPE	The NSW Department of Planning and Environment
DPE Water	The Water group within DPE
EA	Environmental Assessment
EES	Environment, Energy and Science
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ha	hectare
km	kilometre
LSC	land and soil capability
LMP	Land Management Plan (as Appendix I to the Extraction Plan)
LSMP	Landscape Management Plan (this document)
LW	longwall panel
m	metre
MCP	Mine Closure Plan
ML	mining lease
MOP	Mining Operations Plan
Mt	million tonnes
Mtpa	million tonnes per annum
NCOPL	Narrabri Coal Operations Pty Ltd
NSC	Narrabri Shire Council
OEH	The former NSW Office of Environment and Heritage
REA	Reject Emplacement Area
RMP	Rehabilitation Management Plan (as Attachment 3 to this Plan)
ROM	run of mine
SoC	Statement of Commitments
WHC	Whitehaven Coal Limited

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1. Introduction

1.1 Background

The Narrabri Mine is an existing underground coal mining operation situated in the Gunnedah Coalfield. It is located approximately 25 kilometres (**km**) south-east of Narrabri and approximately 60 km north-west of Gunnedah, within the Narrabri Shire Council (**NSC**) Local Government Area in New South Wales (**NSW**). The Narrabri Mine includes an underground coal mine, a coal handling and preparation plant (**CHPP**) and associated rail siding and surface infrastructure.

The Narrabri Mine is operated by Narrabri Coal Operations Pty Ltd (**NCOPL**), on behalf of the Narrabri Mine Joint Venture, which consists of two Whitehaven Coal Limited (**WHC**) wholly owned subsidiaries, and other joint-venture partners[1]. The underground mine is covered by Mining Lease (**ML**) 1609 which covers an area of 5,298 hectares (**ha**) for the predominant purpose of mining for coal from the Hoskissons Coal Seam.

Stage 1 of the Narrabri Mine was approved in November 2007 under Part 3A of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**). Construction of the mine and supporting infrastructure commenced in 2008, with production using a continuous miner following in 2010. Following the approval of the Stage 2 Environmental Assessment (R.W Corkery & Co., 2009) (the **EA**) and the issue of Project Approval 08_0144 for Stage 2 (**Project Approval**) in July 2010 and EPBC approval (2009/5003) in January 2011, the Narrabri Mine was converted to an 8 million tonnes per annum (**Mtpa**) run of mine (**ROM**) longwall mining operation, which commenced in 2012.

The Project Approval has subsequently been modified on a number of occasions. The environmental assessment for Modification 5 (Resource Strategies, 2015) (**MOD 5**), approved in December 2015, changed the mine geometry by reducing the number of longwall (**LW**) panels from 26 to 20, increased some LW panel widths and increased the production to 11 Mtpa of ROM coal until July 2031.

Modification 7, the most recent modification of the Project Approval, was approved on 23 November 2021. The environmental assessment for Modification 7 (Resource Strategies, 2021) (**MOD 7**) describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205[2]. The bord and pillar mining will occur concurrently with existing longwall operations and is scheduled to commence in 2022 for a period of approximately five years. There is no change to the previously approved longwall panels LW 203 to LW 205. The maximum ROM coal production rate of the concurrent operation remains within the approved limit of 11 Mtpa.

The Extraction Plan provides further details of the Narrabri Mine operations to date; a consideration of the applicable statutory requirements and the modifications to the Project Approval; and information relevant to the extraction of coal from pillar reduction panels CF 201 to CF 205 (hereafter referred to as **Panels 201 to 202**). The surface area predicted to be affected by the proposed secondary extraction of Panels 201 to 202 has been defined as the **Extraction Plan Area**.

The underground mining layout for Panels 201 to 202 is presented in Figure 1.1.

[1] For full details on the joint venture ownership, please refer to the introduction of the Extraction Plan.

[2] The pillar reduction panel naming 'CF' is an acronym for 'cut and flit'.

Source: Geoscience Australia (2011); NSW Spatial Services (2019)

LEGEND

— — Underground Mine Footprint

—E— Electricity Transmission Line (Constructed)

ONWARD CONSULTING

NARRABRI COAL MINE

Figure 1.1 : Underground Mining Layout for Panels 201 and 202

1.2 Purpose and scope

As required by Project Approval Schedule 6 Condition 2, this Landscape Management Plan (**LSMP**) for Panels 201 to 202 has been prepared in accordance with the NSW Department of Planning and Environment (**DPE**) *Draft Guidelines for the Preparation of Extraction Plans* (unpublished) (**Extraction Plan Guidelines**). It complies with Schedule 3 Condition 4(g) of the Project Approval, which states that, as part of the Extraction Plan and to the satisfaction of the Resources Regulator, appropriate revisions are to be made to the LSMP as required under Schedule 5 Condition 3. The requirements for the LSMP under this condition are further described in section 1.4.1.

1.3 Objectives

The objectives of this LSMP are to:

- detail all proposed mine activities and potential impacts associated with landscape management for the mine site during the extraction of coal from Panels 201 to 202;
- provide clear and concise descriptions of the responsibilities in relation to the LSMP during the operation and subsequent closure of the Narrabri Mine; and
- describe the performance and completion criteria of the final rehabilitation of the mine.

NCOPL will implement all practical measures to prevent and/or minimise any harm to the environment that may result from construction, operation or rehabilitation activities at the Narrabri Mine.

1.4 Statutory requirements

This LSMP has been prepared in accordance with the applicable conditions and requirements of the Project Approval, EPBC 2009/5003, ML 1609 and all relevant legislation and guidelines as set out in the following sections. A full consideration of the applicable compliance requirements is provided in section 2 of the Extraction Plan.

1.4.1 Project Approval

Project Approval Schedule 5 Condition 3 requires NCOPL to revise the LSMP for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with landscape management for the site (Stages 1 and 2) and subsequently implement this revised version of the LSMP to the satisfaction of the Secretary and the Resources Regulator. This LSMP must:

(a) be submitted to the Secretary for approval by 30 June 2011;

(b) be prepared by suitably qualified expert/s whose appointment/s have been endorsed by the Secretary (refer to section 1.4 of the Extraction Plan);

(c) be prepared in consultation with DPE Water, BCS and NSC (refer to section 1.6 and Attachment 2); and

(d) include a:

- Rehabilitation Management Plan (**RMP**) (refer to Attachment 3); and
- Mine Closure Plan (**MCP**) (refer to Attachment 4).

As described in section 1.1 of the Extraction Plan, Stage 1 of the Narrabri Mine was approved in 2007. As a requirement of that approval, an LSMP was prepared for Stage 1 in 2009 which covered the construction of

surface infrastructure associated with the mine, a box cut and pit bottom area, and infrastructure associated with the underground mining area, an area of 255 ha.

As a requirement of Project Approval Schedule 5 Condition 3, the Stage 1 LSMP has been revised on a number of occasions to encompass all proposed mining activities and potential impacts associated with landscape management for the Narrabri Mine Site, incorporating both Stages 1 and 2. This LSMP has been specifically revised for the extraction of Panels 201 to 202; however, the RMP and the MCP continue to be applicable to the whole Narrabri Mine.

The Project Approval conditions directly relevant to this RMP have been presented in full in Table A1.1 in Attachment 1, together with a cross-reference where the requirements are addressed within this Plan. The Project Approval requirements from Schedule 5 Conditions 4 and 5 related to the RMP and the MCP are further addressed in the respective plans.

Statement of Commitments

The Statement of Commitments for Site Operations and Management (**SoC**) is attached as Appendix 3 to the Project Approval. The SoC contains a number of commitments in relation to rehabilitation and mine closure. These SoCs are further addressed in the RMP and the MCP.

1.4.2 EPBC approval

The Narrabri Mine is subject to EPBC 2009/5003 issued under the EPBC Act. Approval Condition 5 states that in order to minimise potential impacts on EPBC Act listed threatened species and communities within the mine site, NCOPL must actively manage progressive disturbance of the mine site in accordance with an RMP for the life of the mine. This condition is addressed further in the RMP, provided as Attachment 3.

1.4.3 Mining lease

The original ML 1609 issued in 2008 has been amended to include a reference to Extraction Plans, removing the requirements for a Subsidence Management Plan. ML 1609 Condition 22, related to the construction and rehabilitation of access tracks, is addressed in the RMP, provided as Attachment 3. There are no further specific ML conditions related to this LSMP.

1.4.4 Extraction Plan Guidelines

There are no requirements identified in the Extraction Plan Guidelines that relate directly to this LSMP. Requirements related to the RMP or the MCP are outlined in those respective documents.

1.5 Risk assessment

A subsidence risk assessment has been undertaken to identify the risks associated with subsidence at the Narrabri Mine. It builds on previous risk assessments completed for LW 101 to LW 110 and is presented as Appendix K to the Extraction Plan. The updated risk assessment for Panels 201 to 202 has not identified any high-risk items and, as a result, risks associated with subsidence within the Extraction Plan Area for the Narrabri Mine have been assessed as low to moderate.

1.6 Consultation and approval

In accordance with Schedule 3 Condition 4(h) of the Project Approval, NCOPL has prepared this LSMP in consultation with DPE Water, BCS and NSC, prior to submission for approval by the Secretary and the Resources Regulator.

A draft (Revision B) of the BMP was provided for consultation on 3 December 2021. BCS and DPE Water provided responses with no specific comments on 17 December 2021 and 16 March 2022 respectively. NSC provided comments on 11 February 2022, with a single comment in relation to the RMP, regarding ongoing consultation with Council in development and delivery of the weed management programs.

The consultation correspondence is presented in Attachment 2, including a reconciliation table provided as Table A2.1 addressing the NSC comment.

1.7 Access to information

In accordance with Schedule 6 Condition 10 of the Project Approval, the approved Extraction Plan and all appendices, audits and reports, and summaries of all monitoring data (where relevant) will be made publicly available on the WHC website. All information will be kept up to date.

Note that any printed copies of this LSMP are uncontrolled.

2. Mine domains

This LSMP has redefined the mine domains to be consistent with the Narrabri Mine Mining Operations Plan (**MOP**), which has been prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines* (NSW Trade and Investment, 2013) (**MOP Guidelines**).

As defined in the MOP Guidelines, a domain is a land management unit within a mine site, usually with similar geophysical characteristics. Mine domains have been defined as follows:

- **Primary domains** (operational domains) are defined on the basis of land management units within the mine site, with unique operational and functional purpose and therefore similar geophysical characteristics (i.e., during mining). These land management units with similar operational function are likely to have similar geophysical features and constraints / opportunities for rehabilitation;
- **Secondary domains** (post-mining land use domains) are defined as land management units characterised by a similar post mining land use objective (i.e. following mining).

The primary and secondary domains have been defined together with codes which have been allocated for each domain. The codes for the primary domains are numerical and the secondary domains alphabetical, as presented in Table 2.1 and Table 2.2 respectively.

Table 2.1 - Primary domains - operational

Code	Domain area	Primary domain description
1	Infrastructure Area	This domain incorporates all surface infrastructure, including: • the site access road and internal access tracks; • office and administration buildings; • light vehicle carpark, and equipment laydown areas; • workshop and stores buildings; • electrical sub-station and associated electricity infrastructure; • rail loop and train loadout bin and train loader; • sewage treatment plant; • box cut and mine portals; • drift and skyline conveyors; • coal crushing station, CHPP, ROM and product coal pad hardstand areas; • explosives magazine; • ventilation fans and shafts; • gas drainage and mine safety pre-conditioning infrastructure; and • water pipelines.
2	Tailings Storage Facility	Not applicable to Narrabri Mine.
3	Water Management Area	This domain incorporates the: • network of dams • lined evaporation ponds • brine storage ponds; and

Code	Domain area	Primary domain description
		• water diversion bunds and associated water management infrastructure.
4	Reject Emplacement Area (**REA**)	This domain relates to the Reject Emplacement Area
5	Stockpiled Material	This domain includes stockpiled topsoil and material stockpiled in the visual amenity bund.
6	Void (open cut void)	Not applicable to Narrabri Mine
7	Rehabilitation Area	Incorporates all rehabilitation undertaken at the site to date.
8	Underground Mining Area	Area of land subject to subsidence from underground mining activities.
9	Conservation and Biodiversity Offset Area	Managed under the Narrabri Mine On-site Biodiversity Offset Management Plan (**BOMP**) and the Kenna BOMP.

Table 2.2 - Secondary domains - post-mining

Code	Domain area	Secondary domain description
A	Infrastructure	Industrial infrastructure
B	Water Management Area	Includes all water management structures and dams retained in the final landform.
C	Rehabilitation Area - Grassland	Areas of native grasslands.
D	Rehabilitation Area – Pasture	Landholdings that were previously used for agriculture and have been impacted by mining, such as subsidence areas and some infrastructure areas, will be rehabilitated to land and soil capability (**LSC**) Class 3 in accordance with the Land Management Plan (**LMP**), provided as Appendix I to the Extraction Plan
E	Rehabilitation Area – Woodland (Existing)	Woodland areas that have been impacted by mining, such as subsidence areas and some infrastructure areas will be rehabilitated to woodland. This domain will cover approximately 443 ha.
F	Rehabilitation Area - State Forest (Existing)	The areas of the Jacks Creek and Pilliga East State Forests that are within ML 1609 and are impacted by mining, such as subsidence areas, will continue to be used for forestry post-mining. This domain will cover approximately 367 ha.
G	Rehabilitation Area – Rural Land	LSC Class 3 in accordance with the LMP, provided as Appendix I to the Extraction Plan
H	Relinquished Lands	Completely rehabilitated are deemed “Relinquished Lands”, i.e. the area is self-sustaining, has been signed off by all parties, the lease (or a portion of a greater lease) is relinquished, and the security bond has been returned. The mine would have no further responsibility for these areas.
I	Final Void	Not applicable to Narrabri Mine
J	Conservation and Biodiversity Offset Area	Area that will be conserved for biodiversity offset following the cessation of mining (approximately 1,675 ha). In accordance with the EPBC approval, a legally binding conservation covenant will be placed on the title of this domain following the cessation of mining.

3. Trigger action response plan

The following trigger action response plan (**TARP**) has been developed for rehabilitation and mine closure to identify the required management actions in the event of impacts on rehabilitation, or where rehabilitation outcomes are not achieved in an acceptable timeframe. Where necessary, rehabilitation activities will be amended accordingly with the aim of continually improving rehabilitation standards. NCOPL will notify the Resources Regulator and other relevant stakeholders of any incident resulting in major impacts to rehabilitation.

The responses specified within the TARP have been based upon the rehabilitation completion criteria developed during the preparation of the RMP and the current rehabilitation monitoring program. The rehabilitation monitoring program will trigger response actions, as specified in the TARP to ensure that threats to rehabilitation do not become unmanageable.

The TARP is provided in Table 3.1 and will be reviewed and revised (if required) as conditions at NCOPL change or new risks to rehabilitation are identified.

3.1 First tier triggers

First tier triggers are intended to detect early indications that rehabilitation is not trending toward desired completion criteria. As described within the monitoring program, use of remote sensing techniques is being implemented to establish and monitor first tier triggers to identify:

- deteriorating vegetation health in rehabilitation and offset areas;
- variability in total biomass and vegetation density in each strata of vegetation communities; and
- changes in soil properties without disturbance.

A statistical variation in monitoring results, or a statistically significant overall decline in vegetation health, will trigger further on-ground assessments to confirm any adverse impacts, and early intervention management responses.

Remote sensing monitoring enhances early intervention since instances where rehabilitation indicators are trending toward trigger values can be identified from desktop assessments independent of scheduled on-ground monitoring programs. Additionally, adjacent vegetation health can be assessed using remote sensing without requiring access arrangements or disturbance and can assist to identify external risks to rehabilitation.

3.2 Second tier triggers

Quantitative and qualitative trigger values for key indicators have also been developed and documented for the site. Trigger values have been developed based on monitoring program outcomes, including rehabilitation areas, biodiversity offset areas and selected analogue sites.

These are monitored annually, and the results reported in the Annual Review

Table 3.1 - Trigger Action Response Plan

Aspect / category	Key element	Element number	Trigger / response	1st level trigger	2nd level trigger
Spontaneous combustion	Evidence of spontaneous combustion in capped and rehabilitated sections of REA (Domain 4)	1	Trigger	Isolated incidence of heating in REA	Multiple incidences of ignition in REA
			Response	Investigate sources of potential ignition. Excavate material with propensity for spontaneous combustion in proximity to rehabilitated surface. Review reject emplacement practices.	Consult with regulators to develop remediation plan to mitigate spontaneous combustion such as increased capping depth. Review spontaneous combustion management and reject emplacement practices.
Soil type(s) and suitability quality	Salinity	2	Trigger	Increasing trend in soil/water salinity levels.	Presence of salt scalds
			Response	Undertake soil testing to verify EC and recommend further soil amelioration.	Engage a specialist consultant to develop a site-specific management report to be implemented to remediate salinity scalds. Undertake works as required.
	Soil biophysical and chemical characteristics	3	Trigger	Soil nitrogen, potassium and phosphorous levels are not in the range of analogue sites by Year 5.	Soil physical, chemical and biological characteristics are not able to sustain the desired final land use.
			Response	Engage a consultant to recommend appropriate soil amelioration. Undertake amelioration and re-vegetation in accordance with the consultant recommendations.	Engage a consultant to recommend appropriate soil amelioration. Undertake amelioration and re-vegetation in accordance with the consultant recommendations.
	Topsoil depth	4	Trigger	Topsoil is not reinstated to, at least, the minimum depth specified for the proposed final land use.	Sufficient suitable topsoil cannot be identified for reinstatement at the minimum specified depth for the proposed final land use.
			Response	Top dress with additional suitable topsoil resource. If additional suitable material is not immediately available stabilise the area with cover crop until additional suitable topsoil is sourced and re-emplaced.	Undertake a review of the topsoil balance to confirm sufficient material to meet minimum depth requirements. Investigate suitable topsoil resource substitutes and introduce if required.
Erosional stability of final capping layer (REA and mine site)	Slope gradient in REA	5	Trigger	<70% of the rehabilitated REA has slopes within the limits stipulated in the MOP/RMP.	<55% of the rehabilitation area has slopes within the limits stipulated in the MOP.
			Response	Undertake re-grading and revegetation of the REA.	Undertake a review of the landform design, including survey if required. Undertake re-grading and revegetation of the area.
	Erosion control	6	Trigger	Minor gully or tunnel erosion present and/or minor rilling (rilling up to 200 mm in depth or width).	Slumping and/or significant gully or tunnel erosion present and/or significant rilling (>200mm), which is compromising landform.
			Response	An inspection of the site will be undertaken by a suitably trained person. Investigate opportunities to install water management infrastructure to address erosion. Remediate as appropriate.	Engage a consultant 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	7	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 suitably trained person. 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	8	Trigger	Water management structures (sediment dams, channels, contour banks) minor erosion and/or scouring as determined by monitoring.	Water management structures fail or display significant scouring / erosion as determined by monitoring.
			Response	An inspection of the site will be 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.
Seepage from REA landform	Seepage from REA landform	9	Trigger	Isolated incidence of seepage from REA	Landform exhibiting seepage issues, threatening or causing material harm to the environment.
			Response	An inspection of the site will be undertaken by a suitably qualified person. Investigate opportunities to address issues. Remediate as appropriate.	An inspection of the site will be undertaken by a suitably qualified person. Identify remedial actions. Consult with regulators on corrective actions required.

Aspect / category	Key element	Element number	Trigger / response	1st level trigger	2nd level trigger
Revegetation	Groundcover %	10	Trigger	Minimum of 60% groundcover is not present within six months of seeding initial pasture mix, compared to the control site.	Vegetative cover is 50% or less at year 1.
			Response	Undertake a field survey to identify likely causes of unsatisfactory germination rates. Re-seed areas with unsatisfactory cover. Review seeding procedures incl. seasonal mixes, timing and seed rate per hectare.	Engage a suitably qualified specialist to investigate causes for germination failure and recommend remedial actions. Implement appropriate management actions including revising rehabilitation procedures if required.
	Weeds	11	Trigger	Six months following seeding, no significant weed infestations and weeds do not comprise a significant proportion of the species in any stratum (less than 20% increase in exotic species number and cover)	Six months following seeding, no significant weed infestations and weeds do not comprise a significant proportion of the species in any stratum (more than 20% increase in exotic species number and cover)
			Response	Engage weed management contractor to remove / spray introduced weed species.	Engage weed management contractor to remove introduced weed species. Investigate management measures to improve native plant establishment and weed suppression including additional soil amelioration, establishment and retention of cover crops until weed presence is at acceptable levels. Implement recommendations as appropriate.
	Vegetation health	12	Trigger	Vegetation health index not in the range of analogue sites.	Long term declining trend in vegetation health index.
			Response	Engage ecologist to undertake preliminary investigations. ≥	Engage ecologist to undertake investigation to determine the cause of change. Prepare a site-specific management plan and implement recommendation actions.
	Tree death	13	Trigger	Less than 25% of trees are observed to be deteriorating (i.e. not healthy and growing) above recently subsided area, as indicated by long term monitoring.	More than 25% of trees are observed to be deteriorating (i.e. not healthy and growing) above recently subsided area, as indicated by long term monitoring.
			Response	Review requirement for supplementary planting.	Prepare a site-specific management plan and implement recommendation actions, including supplementary planting, amelioration and soil improvement requirements
	Feral animal species presence	14	Trigger	Feral animal species presence and density increased following annual monitoring events.	Significant numbers of feral pests causing widespread damage in rehabilitated areas.
			Response	Review feral pest control program to increase effectiveness.	Engage a suitably qualified specialist to prepare a site management plan and implement recommendations such as augmenting feral pest exclusion fencing and re-vegetation.
	Native fauna	15	Trigger	Loss or deterioration of rehabilitation sites.	Decline in trend in recorded fauna numbers and/or presence and abundance (allow for natural variation occurring in analogue sites), identified through long term monitoring.
			Response	Undertake remediation works to increase rehabilitation quality.	A site-specific management report to be prepared and implemented where necessary in accordance with the relevant threatened species threat abatement plan (if applicable). Actions may include targeted monitoring to determine overall impact to population of impacted species.
Drought	Drought affecting rehabilitated areas	16	Trigger	Drought results in vegetation health index not in the range of analogue sites during inspections.	Inspections identify long term declining trend in vegetation health index due to drought.
			Response	Engage ecologist to undertake preliminary investigations. Prepare a site-specific management plan and implement recommendation actions.	Engage ecologist to undertake investigation to determine the cause of change and recommend actions. Prepare a site-specific management plan and implement recommendation actions in consultation with regulators.

Aspect / category	Key element	Element number	Trigger / response	1st level trigger	2nd level trigger
Mine subsidence	Mine subsidence in rehabilitated areas	17	Trigger	Vegetation health index not in the range of analogue sites, and/or survey data shows that subsidence has reached upper limit of impact assessment predictions (but not exceeded).	Subsidence exceeds impact assessment predictions and/or inspections identify long term declining trend in vegetation health index in subsidence areas.
			Response	Engage ecologist to undertake preliminary investigations. Engage subsidence engineer to review predictions. Prepare a site-specific management plan and implement recommendation actions.	Engage subsidence engineer to review model and ecologist to undertake investigation to determine the cause of change. Prepare a site-specific management plan and implement recommendation actions.
Contaminated land	Contamination	18	Trigger	Water/soil monitoring results identify presence of hydrocarbons that exceed baseline levels.	Rehabilitation inspections and/or monitoring results identify a hydrocarbon contamination that presents a risk of material harm to the environment
			Response	Engage specialist to undertake preliminary investigations. Implement remediation strategy.	Engage specialist to undertake investigation to determine the cause of the incident. Report incident as per the NCOPL PIRMP. Prepare a site-specific management plan and implement recommendation actions.
Greenhouse gas	Greenhouse gas	19	Trigger	Inspections identify that former ventilation shafts/boreholes/mine entries have not been sealed in accordance with required standards.	N/A
			Response	Engage specialist to undertake investigations and develop sealing strategy. Implement actions in consultation with regulators.	N/A
Agricultural resources	Loss of agricultural resources	20	Trigger	Vegetation health index not in the range of analogue agricultural sites.	Long term declining trend in vegetation health index in agricultural land.
			Response	Engage ecologist/agronomist to undertake preliminary investigations. Implement remedial actions.	Engage ecologist/agronomist to undertake investigation to determine the cause of change. Prepare a site-specific management plan and implement recommendation actions.
Surface water	Water quality in Pine Creek and Kurrajong Creek	21	Trigger	Water quality exceeds baseline values	Long term upward/downward trend outside ANZECC quality guideline limits values
			Response	Review and investigation of water quality monitoring and management where appropriate. Implement relevant remedial measures where required.	Hydrologist (or similar specialist) to review sampling and climate data and review likely cause(s). If mine related, undertake assessment to identify sources of water quality degradation and recommend remedial actions Implement specialist recommendations
	Discharge water quality at licenced discharge points	22	Trigger	Sediment basin discharge exceeds EPL criteria for pH, TSS and/or oil/grease	Long term upward/downward trend outside ANZECC quality guideline limits
			Response	Re-sampling will be undertaken during the next discharge event to confirm results exceed limits and investigate potential causes.	Review sediment basin maintenance and discharge procedures, and sediment basin capacity requirements. Undertake required corrective actions.
Final land use	Steepness of landform batter slopes	23	Trigger	Ongoing surveys of REA during construction identifies slopes are not being constructed to design specifications.	Rehabilitation monitoring identifies failures/deficiencies in final landform design that require external reporting
			Response	Re-profile areas of REA to ensure final landform is meeting design criteria.	Engage specialist to undertake investigation and implement recommended remedial actions in consultation with regulators
Closure performance	Poor closure design	24	Trigger	Rehabilitation monitoring identifies failures/deficiencies in final landform design.	Rehabilitation monitoring identifies failures/deficiencies in final landform design that require external reporting
			Response	Engage specialist to undertake investigation and implement recommended remedial actions.	Engage specialist to undertake investigation and implement recommended remedial actions in consultation with regulators.
Closure costs	Insufficient cover material	25	Trigger	Annual update of the material balance identifies minor shortfall for closure (<10%)	Annual update of material balance identifies major shortfall for closure (>10%)
			Response	Identify alternative options for obtaining cover material.	Identify alternative options for obtaining cover material and or modifying capping depth in consultation with regulators.

4. Plan implementation

4.1 Roles and responsibilities

To ensure adequate implementation of this LSMP, the following responsibilities have been assigned to relevant NCOPL personnel as detailed in Table 4.1. It is also noted that additional responsibilities are referred to within the Extraction Plan and the appended sub-plans.

Table 4.1 - Roles and responsibilities

Roles	Responsibilities
General Manager	• Ensure that adequate resources are available to NCOPL personnel to facilitate the completion of their responsibilities under this LSMP. • Communication with statutory authorities and the community.
Mine Manager	• Ensure all contractors, sub-contractors and service-personnel are appropriately qualified, competent and licensed to undertake the required work and have a good environmental performance record. • Ensure the LSMP is implemented and adhered to.
Environmental Superintendent	• Ensure that all monitoring and reporting under the LSMP (and associated RMP and MCP) is carried out within the timeframes specified, and is checked, processed and filed appropriately. • Advise on matters identified in all approval, permit, licence and consent documents and ensure all operations are conducted in compliance with those conditions, and all other environmental obligations. • Ensure all rehabilitation is completed as per the approved documents and in a timely manner. • Liaise with stakeholders regarding subsidence impact management. • Authorise changes to this LSMP

Though retaining the responsibilities identified above, these personnel may, at their discretion, delegate specific tasks to suitably qualified and experienced operational personnel or consultants.

5. Reporting, evaluation and review

5.1 Annual Review

In accordance with Schedule 6 Condition 6, NCOPL will review the performance of its landscape management for the previous calendar year and report the relevant results within the Annual Review, to the satisfaction of the Secretary. The Annual Review will at minimum provide information regarding the effectiveness of the management measures to prevent, and if prevention is not reasonable and feasible, to minimise any impact on the landscape.

Further, the Annual Review requires a number of items to be reviewed or assessed. In summary these are:

- monitoring results and complaints;
- non-compliances and incidents;
- compliance with performance measures;
- discrepancies between predicted and actual impacts; and
- measures to be implemented to improve environmental performance.

The Annual Review may also make recommendations for any additions, changes or improvements to the landscape management process.

The Annual Review will be made available on the WHC website.

5.2 Independent environmental audits

Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, NCOPL will commission and pay the full cost of an Independent Environmental Audit (**IEA**) of the operations at Narrabri Mine (Stages 1 and 2), to be conducted in accordance with the requirements under Schedule 6 Condition 7.

The audit team will be led by a suitably qualified auditor and the IEA will be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary.

5.3 Management plan review and evaluation

As required by Schedule 6 Condition 3 of the Project Approval, within three months of any of the following:

- completion of an independent environmental audit (as required by Schedule 6 Condition 7);
- submission of an Incident Report (as required by Schedule 6 Condition 4);
- submission of an Annual Review (as required by Schedule 6 Condition 6); and
- any modification to the conditions of the Project Approval (unless the conditions require otherwise),

NCOPL will the review, and if necessary, revise this LSMP. This is to ensure that the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the Narrabri Mine operations. The review history table in the front of this Plan provides the details of each review.

Condition 3 of Schedule 6 further states that if the review determines that this LSMP requires revision, then this will be completed to the satisfaction of the Secretary.

6. Incidents and non-compliance

6.1 Incident notification

An incident is defined under the Project Approval as *a set of circumstances that causes or threatens to cause material harm, and/or breaches or exceeds the limits of performance measures/criteria*. Material harm to the environment is defined under the Project Approval as *involving actual or potential harm to the health or safety of human beings or to the environment that is not trivial.* This definition excludes "harm" that is authorised under either the Project Approval or any other statutory approval (e.g., the EPL).

In the event of any exceedance of performance criteria, NCOPL will advise the Secretary and any other relevant agencies as soon as practicable after becoming aware of the incident, in accordance with Schedule 6 Condition 4. Within 7 days of the event, NCOPL will also provide the Secretary and any relevant agencies a detailed report which will:

- describe the date, time and nature of the exceedance/incident;
- identify the cause (or likely cause) of the exceedance/incident;
- describe what action has been taken to date; and
- describe the proposed measures to address the exceedance/incident.

Notifications to the EPA will be made by contacting the Environment Line service on 131 555 and written details of the notification will be provided within 7 days of the date on which the incident occurred.

Incident reporting and emergency response is further described in NCO's Environmental Management System.

6.2 Non-compliance notification

In accordance with Schedule 6 Condition 2, where a non-compliance with statutory requirements or an exceedance of the relevant criteria or performance measures has occurred, NCOPL will, at the earliest opportunity, take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur. Once this has been achieved, all reasonable and feasible options for remediation (where relevant) will be considered.

In accordance with Schedule 6 Condition 4, within seven days of becoming aware of a non-compliance, NCOPL will notify DPE of the non-compliance[3]. The notification will be made in writing via the Major Projects website and identify the development (including the development application number and name), set out the condition or requirement that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

NCOPL will implement any reasonable remediation measures as directed by the Secretary, to the satisfaction of the Secretary.

[3] A non-compliance which has been notified as an incident under section 6.1 does not need to also be notified as a non-compliance.

7. Complaints management

Any complaints received in relation to this LSMP will be managed in accordance with the complaints management protocol, as follows:

- publicly advertised telephone complaints line, 1800WHAVEN, will be in place to receive complaints;
- each complaint received will be recorded in the Complaints Register, which will include the following details:
  - date and time of complaint;
  - method by which a complaint was made;
  - personal details the complainant wishes to provide or, if no such details are provided, a note to that effect;
  - nature of the incident that led to the complaint;
  - action taken by NCOPL in relation to the complaint (i.e., any required remedial actions), including any follow-up contact with the complainant; and
  - if no action was taken, the reason why no action was taken;
- the Environmental Superintendent will be responsible for ensuring that an initial response is provided within 24 hours of receipt of a complaint (except in the event of complaints recorded when the mine is not operational or outside of usual business hours);
- once the identified measures are undertaken, the Environmental Superintendent will sign off on the relevant complaint within the Complaints Register;
- if necessary, follow-up monitoring will take place to confirm the source of the complaint is adequately mitigated; and
- a summary of the complaints will be maintained by NCOPL and made available to the Community Consultative Committee, the complainant (on request) and on the WHC website. A summary of complaints received every 12 months will be provided in the Annual Review.

The Environmental Superintendent retains ultimate responsibility to ensure that complaints received are properly recorded and addressed appropriately.

In the event that any complainant considers that NCOPL has not adequately addressed their concerns, the NCOPL representative will convene additional meetings with the complainant. If the complainant believes the matter remains unresolved, and no further agreement can be reached as to additional measures to be undertaken, then they may refer the matter to DPE.

8. References

Department of Planning and Environment (unpublished). *Guidelines for the Preparation of Extraction Plans*.

Ditton Geotechnical Services (2017) *Mine Subsidence Assessment for the Proposed LW107 to LW110 Extraction Plan at the Narrabri Mine*. Prepared for Narrabri Coal Operations Pty Ltd.

Ditton Geotechnical Services (2021) *Mine Subsidence Assessment for Pillar Reduction Panels CF201-CF205 (A-J) and Longwalls LW203 to LW205 at the Narrabri Underground Mine.* Prepared for Narrabri Coal Operations Pty Ltd. DGS Report No. NAR-004/8. Prepared for Narrabri Coal Operations Pty Ltd.

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

Resource Strategies (2015) *Narrabri Mine Modification 5 - Environmental Assessment*. Prepared for Narrabri Coal Operations Pty Ltd.

Resource Strategies (2021) *Narrabri Mine Modification 7 - Environmental Assessment.* Prepared for Narrabri Coal Operations Pty Ltd.

RW Corkery & Co. Pty Ltd (2009) *Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project*, Project Application No:MP08_0144. Prepared for Narrabri Coal Operations Pty Ltd.

9. Glossary

Term	Definition[4]
Environmental consequences	The environmental consequences of subsidence impacts including: damage to built features; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls; damage to Aboriginal heritage sites; impacts to aquatic ecology; ponding.
Extraction Plan Area	The area predicted to be affected by the proposed secondary extraction of the approved pillar reduction panels CF 201-205.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
MOD 5	Reduced the number of longwall panels from 26 to 20; increased the longwall panel widths for LW 107 to LW 120 from approximately 295 m to approximately 400 m; extended the western footprint approximately 60 m; and increased the maximum ROM coal processing rate from 8 Mtpa to 11 Mtpa.
MOD 7	Describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205
Panels 201 to 202	Pillar reduction panels CF 201 to CF 205
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
Project Approval	Development consent (DA_08_0144) issued on 26th July 2010 under Section 75J of the *Environmental Planning and Assessment Act 1979* by the Department of Planning & Infrastructure (as modified).
Rehabilitation	The restoration of land disturbed by the development to ensure it is safe, stable and non-polluting over the short, medium and long term
Secretary	Planning Secretary under the EP&A Act, or nominee
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts.
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, including both vertical and horizontal displacement, tilt, strain and curvature.
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs.

[4] The majority of the definitions are as provided in Project Approval 08_0144.

Attachment 1 Compliance conditions relevant to the LSMP

Table A1.1 - Relevant Project Approval 08_0144 requirements

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
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.	Section 1.3
Schedule 2 Condition 11	With the approval of the Secretary, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis. ***Note**: The conditions of this approval require certain strategies, plans, and programs to be prepared for the project. They also require these documents to be reviewed and audited on a regular basis to ensure they remain effective. However, in some instances, it will not be necessary or practicable to prepare these documents for the whole project at any one time, particularly as these documents are intended to be dynamic and improved over time. Consequently, the documents may be prepared and implemented on a progressive basis, subject to the conditions of this approval. In doing this however, the Proponent will need to demonstrate that it has suitable documents in place to manage the existing operations of the project.*	There is no staging for the LSMP for Panels 201-202
Schedule 3 Condition 4	The Proponent shall prepare and implement Extraction Plans for any second workings to be mined to the satisfaction of the Secretary. Each Extraction Plan must:	
	g) include the following to the satisfaction of the Resources Regulator:	
	• appropriate revisions to the Landscape Management Plan required under Condition 3 of Schedule 5;	This Plan
Schedule 5, Condition 3	The Proponent shall revise the Landscape Management Plan for the Stage 1 project to encompass all proposed mine activities and potential impacts associated with landscape management for the site (Stages 1 and 2) and subsequently implement this revised version of the Landscape Management Plan to the satisfaction of the Secretary and the Resources Regulator. This plan must:	
	a) be submitted to the Secretary for approval by 30 June 2011;	
	b) be prepared by suitably qualified expert/s whose appointment/s have been endorsed by the Secretary;	Refer to Extraction Plan section 1.4
	c) be prepared in consultation with DPE Water, BCS and NSC; and	Section 1.6 Attachment 2
	d) include a:	
	• Rehabilitation Management Plan; and	Attachment 3
	• Mine Closure Plan.	Attachment 4
Schedule 6, Condition 2	The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	(a) detailed baseline data;	Section 2 RMP and MCP
	(b) a description of:	

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
	• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 1.4
	• any relevant limits or performance measures/criteria;	Section 1.4
	• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures	Section 1.4.1
	(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria:	Section 1.4
	(d) a program to monitor and report on the:	
	• impacts and environmental performance of the project;	RMP and MCP
	• effectiveness of any management measures (see (c) above);	RMP and MCP
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	RMP and MCP
	(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	RMP and MCP
	(g) a protocol for managing and reporting any;	
	• incidents;	Section 6.1
	• complaints;	Section 7
	• non-compliances with statutory requirements; and	Section 6.2
	• exceedances of the impact assessment criteria and/or performance criteria; and	
	(h) a protocol for periodic review of the plan.	Section 5.3
Schedule 6 Condition 3	Within 3 months of the submission of an:	Section 5.3
	(i) audit under condition 7 of Schedule 6;	
	(j) incident report under condition 4 of Schedule 6; and	
	(k) annual review under condition 5 of Schedule 6; and	
	(l) any modification to the conditions of this approval (unless the conditions require otherwise),	
	the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.	
Schedule 6 Condition 4	The Proponent shall notify the Secretary in writing via the Major Projects website and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.	Section 6.1

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
Schedule 6 Condition 5	The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Secretary.	Section 5
Schedule 6 Condition 6	By the end of March each year, the Proponent must submit a review of the environmental performance of the project for the previous calendar year to the satisfaction of the Secretary.	Section 5.1
Schedule 6 Condition 7	Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project (Stages 1 and 2).	Section 9.2
Schedule 6 Condition 10	The Proponent shall: (a) make copies of the following publicly available on its website: • the documents referred to in Condition 2 of Schedule 2; • all current statutory approvals for the project; • all approved strategies, plans and programs required under the conditions of this approval; • a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs; • a complaints register, updated on a monthly basis; • minutes of CCC meetings; • the annual reviews of the project; • any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit; • any other matter required by the Secretary; and	Section 1.7
	(b) keep this information up-to-date, to the satisfaction of the Secretary.	Section 1.7

Attachment 2 Consultation records

This information is provided by Narrabri Shire Council

Our Reference: DLA:MH: 1954336
Your Reference: PAE-34658815
Contact Name: Donna Ausling

Mr. Brent Baker
Whitehaven Coal Ltd
10 Kurrajong Creek Road
Baan Baa NSW 2390

VIA EMAIL: BrentBaker@whitehavencoal.com.au

NARRABRI SHIRE
DISCOVER THE POTENTIAL

explore NARRABRI region

Friday, 11 February 2022

Re: Narrabri Mine Extraction Plan (Panels 201-202) - Post Approval Consultation- PAE-34658815

Dear Mr Baker,
Thank you for the opportunity to provide feedback on the draft Narrabri Mine Extraction Plan for Panel 201-202, comprising a draft Landscape and Rehabilitation Management Plans.

It is acknowledged that the objectives of the draft Extraction Plan are to identify sensitive and environmental built features within the affected by the proposed secondary extractions of the approved pillar reduction panels CF201 – CF205 and to manage the potential impacts and/or environmental consequences to ensure compliance with the terms of the approval. It is noted that these objectives are intended to be achieved by:

- Implementing the proposed monitoring and management measures to reduce the identified subsidence risks; and
- Implementing a review, reporting, and auditing process to provide possible feedback on the proposed monitoring and management measures and to allow for continual improvement.

In relation to the draft *Extraction Plan*, Council generally concurs with the contents of the draft Plan. In relation to Section 4.3 (p.28) of this Plan ongoing liaison with Council (as appropriate) should be undertaken in relation to any contingency responses and adaptive management measures.

Council raises no specific concerns in relation to the draft *Landscape Management Plan* as presented which is required to be prepared in consultation with Narrabri Shire Council under the terms of the project approval.

In relation to the draft *Rehabilitation Management Plan*, Council generally concurs with the contents of the Plan. Ongoing consultation with Council in the development and delivery of weed management programs, as detailed in section 7 of the draft Plan, is considered appropriate and necessary and this mechanism should be built into the draft Plan.

Narrabri Shire Council
46 - 48 Maitland Street
PO Box 261, Narrabri NSW 2390

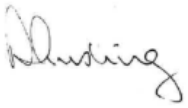
P. (02) 6799 6866
F. (02) 6799 6888

E. council@narrabri.nsw.gov.au
www.narrabri.nsw.gov.au

This information is provided by Narrabri Shire Council

Thank you for the opportunity to provide feedback. Should you require any additional information or clarification you are invited to contact the undersigned on (02) 6799 6886 or by emailing council@narrabri.nsw.gov.au.

Yours faithfully,



Donna Ausling
Manager Strategic Planning

Document Set ID: 1954336
Version: 2, Version Date: 11/02/2022

Print Date: 11 February 2022, 3:54 PM

NSW GOVERNMENT | Planning, Industry & Environment

Our ref: DOC21/1096933

Mr Brent Baker
Narrabri Coal Operations
approval@whitehavencoal.com.au

Dear Brent

Narrabri Coal Mine – Panels 201-202 – Extraction and Biodiversity Management Plans

Thank you for your e-mail dated 3 December 2021 to the Biodiversity, Conservation and Science Directorate (BCS) of the Department of Planning, Industry and Environment inviting comments on the Extraction and Biodiversity Management Plans for panels 201-202.

BCS has reviewed the plans and our comments are provided in **Attachment A.**

Please note that BCS no longer has responsibility for Cultural Heritage matters. As discussed over the phone the Heritage Management Plan will need to be referred to Department of Premier and Cabinet, Heritage Division at heritagemailbox@environment.nsw.gov.au .

If you require any further information regarding this matter, please contact Michelle Howarth, Senior Conservation Planning Officer, via michelle.howarth@environment.nsw.gov.au or (02) 6883 5339.

Yours sincerely

Samantha Wynn

Samantha Wynn
Senior Team Leader Planning North West
Biodiversity, Conservation and Science Directorate

17 December 2021

48–52 Wingewarra Street, Dubbo NSW 2830 | PO Box 2111 Dubbo NSW 2830 | dpie.nsw.gov.au | 1

NSW GOVERNMENT | Planning, Industry & Environment

Attachment A

BCS's comments and recommendations

Narrabri Mine – Panels 201 - 202 – Extraction Plan and Biodiversity Management Plan

Reference in Plan	BCS Comments	BCS Recommendations
Table 7.1 of BMP 'Threatened fauna'	The trigger detailed in Table 7.1 for threatened fauna 'greater than 10% decrease in recorded fauna numbers' has a response of 'no action required'. This is not an adequate response.	A decrease of greater than 10% could be considered a significant change and therefore an appropriate action must be identified to respond to this.
Table 6.1 of BMP 'Threatened fauna populations' And Table 7.1 of BMP 'Threatened fauna'	The performance criteria for 'Threatened fauna populations and habitat are maintained' in table 6.1 states 'threatened fauna and their habitat do not experience adverse impacts, including reduction in habitat area, hollow-bearing trees and woody debris' However, in table 7.1 the level 1 trigger for threatened fauna states 'loss of habitat presence, hollow bearing trees and woody debris' and the level 1 action is 'no action required. This is not an adequate response.	The trigger should identify targets that adhere to the SMART principles (specific, measurable, achievable, realistic and timely). Given that there is no specific loss targets identified for this trigger, an appropriate response is required if any loss is detected.

NSW GOVERNMENT

Department of Planning and Environment

Brent Baker

Email: NCO-approval@whitehavencoal.com.au

Contact: DPE Water Assessments

Email: water.assessments@dpie.nsw.gov.au

Our ref: OUT22/1844

16 March 2022

Dear Mr Baker

Re: Extraction Plan 201-202 – Water Management Plan for Narrabri Coal Mine – Stage 2 – MP08_0144-PA-23

I refer to your email request to the Department of Planning and Environment (DPE) Water about the above matter.

Department of Planning and Environment - Water (DPE Water) has reviewed the Extraction Plan 201-202 – Water Management Plan (WMP) and has a number of recommendations to further understand the management of water. Please see **Attachment A** for more detail.

Should you have any further queries in relation to this submission please do not hesitate to contact DPE Water Assessments at water.assessments@dpie.nsw.gov.au.

Yours sincerely,

E Rogers

Liz Rogers

Manager, Assessments, Knowledge Division

Department of Planning and Environment: Water

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150 | Locked Bag 5022, Parramatta NSW 2124 | dpie.nsw.gov.au

Attachment A

Detailed advice regarding the Extraction Plan 201-202 – Water Management Plan for Narrabri Coal Mine – Stage 2 – MP08_0144-PA-23

1.0 Management of water on the pit top area

1.1 Recommendation

- That the proponent summarise the management of water on the pit top area in the WMP.

1.2 Explanation

Details on pit top area water management were not included in the WMP (Section 2.1.2), rather the Site WMP was referenced. Details regarding the management of water on the pit top area should be summarised in the WMP from the Site WMP to make the WMP a standalone document.

2.0 Baseline water quality

2.1 Recommendation

- That the proponent summarise baseline water quality for surface water (Section 5.2) and groundwater (Section 6.3) in the WMP

2.2 Explanation

In Sections 5.2 and 6.3 in the WMP, surface and groundwater baseline quality and/or level information are not included and only the Site WMP is referenced. Baseline data should be summarised in the WMP from the Site WMP to make the WMP a standalone document.

3.0 Trigger Levels

3.1 Recommendation

- That the proponent include all trigger levels in Section 6.5.3 and Tables 6.1 and 7.

3.2 Explanation

In Sections 6.5.3 and Tables 6.1 and 7.1 in the WMP, trigger levels are referenced to the Site WMP and not included in the WMP. All trigger levels should be summarised in the WMP from the Site WMP to make the WMP a standalone document.

4.0 Complaints and Non-Compliances

4.1 Recommendation

- That the proponent include details on responding to complaints and non-compliances with statutory requirements.

4.2 Explanation

Details on responding to complaints and non-compliances with statutory requirements was not presented in the WMP as required by the Project Approval, Schedule 6 Condition 2(g). These details should be included in the WMP.

5.0 Consultation Records

5.1 Recommendation

- That the proponent include consultation records in Attachment 2, as referenced in the WMP.

Landscape Management Plan (Revision B) - comments reconciliation

DPE Water

Item	Section #	Section heading	Existing text / explanation	Comment / recommendation	Response
No comments provided by DPE Water on the LSMP, RMP or MCP					

NSC comments on the RMP (Revision B)

Item	Section #	Section heading	Existing text / explanation	Comment / recommendation	Response
1	7.3.1	Weeds	No specific text reference	In relation to the draft Rehabilitation Management Plan, Council generally concurs with the contents of the Plan. Ongoing consultation with Council in the development and delivery of weed management programs, as detailed in section 7 of the draft Plan, is considered appropriate and necessary and this mechanism should be built into the draft Plan.	The following sentence has been added to the text in section 7.3.1: *Council will be consulted on an ongoing basis in the development and delivery of weed management programs*.

BCS comments

Item	Section #	Section heading	Existing text / explanation	Comment / recommendation	Response
No comments provided by BCS on the LSMP, RMP or MCP					

Attachment 3 Rehabilitation Management Plan

NARRABRI MINE

EXTRACTION PLAN

REHABILITATION MANAGEMENT PLAN

PANELS 201 - 202

Prepared by:

Title	Name	Signature	Date
Senior Environmental Manager	S. van der Meulen Onward Consulting		30 March 2022
Director	Mark Vile Onward Consulting		30 March 2022

Onward document number:
NCO-004G-0 PLN

Document review history

In accordance with Project Approval Schedule 6 Condition 3, this document has been reviewed as follows:

Review Date	Reason for review	Reviewed by	Revision required (Y/N)

Acronyms and abbreviations

Acronym	Description
°	degree
AMD	acid mine drainage
BCS	The Biodiversity Conservation and Science Directorate within DPE
BMP	Biodiversity Management Plan (as Appendix H to the Extraction Plan)
BOA	Biodiversity Offset Area
CHPP	Coal Handling and Preparation Plant
DAWE	Commonwealth Department of Agriculture, Water and Environment
DGS	Ditton Geotechnical Services
DPE	The NSW Department of Planning and Environment
DPE Water	The Water group within DPE
DRE	The former Division of Resources and Energy within the former DPI (now Resources Regulator)
EA	Environmental Assessment
EES	Environment, Energy and Science
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ha	hectare
km	kilometre
km^2	square kilometre
LiDAR	light detection and ranging
LSC	land and soil capability
LFA	Landscape Function Analysis
LMP	Land Management Plan (as Appendix I to the Extraction Plan)
LSMP	Landscape Management Plan (as Appendix F to the Extraction Plan)
LW	longwall panel
m	metre
MCP	Mine Closure Plan
ML	mining lease
mm	millimetre
mm/m	millimetre per metre
MOP	Mining Operations Plan
Mt	million tonnes
Mtpa	million tonnes per annum
NAF	non-acid forming
NCOPL	Narrabri Coal Operations Pty Ltd
NSC	Narrabri Shire Council

Acronym	Description
OEH	The former NSW Office of Environment and Heritage
PED	personal emergency device (communications system)
PIRMP	Pollution Incident Response Management Plan
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
POEO Regulation	Protection of the Environment Operations (General) Regulation 2009
REA	Reject Emplacement Area
RMP	Rehabilitation Management Plan (this document)
ROM	run of mine
SoC	Statement of Commitments
TARP	trigger action response plan
WHC	Whitehaven Coal Limited
WMP	Water Management Plan (as Appendix G to the Extraction Plan)

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Tables

Figures

1. Introduction

1.1 Background

The Narrabri Mine is an existing underground coal mining operation situated in the Gunnedah Coalfield. It is located approximately 25 kilometres (**km**) south-east of Narrabri and approximately 60 km north-west of Gunnedah, within the Narrabri Shire Council (**NSC**) Local Government Area in New South Wales (**NSW**). The Narrabri Mine includes an underground coal mine, a coal handling and preparation plant (**CHPP**) and associated rail siding and surface infrastructure.

The Narrabri Mine is operated by Narrabri Coal Operations Pty Ltd (**NCOPL**), on behalf of the Narrabri Mine Joint Venture, which consists of two Whitehaven Coal Limited (**WHC**) wholly owned subsidiaries, and other joint-venture partners[1]. The underground mine is covered by Mining Lease (**ML**) 1609 which covers an area of 5,298 hectares (**ha**) for the predominant purpose of mining for coal from the Hoskissons Coal Seam.

Stage 1 of the Narrabri Mine was approved in November 2007 under Part 3A of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**). Construction of the mine and supporting infrastructure commenced in 2008, with production using a continuous miner following in 2010. Following the approval of the Stage 2 Environmental Assessment (R.W Corkery & Co., 2009) (the **EA**) and the issue of Project Approval 08_0144 for Stage 2 (**Project Approval**) in July 2010 and EPBC approval (2009/5003) in January 2011, the Narrabri Mine was converted to an 8 million tonnes per annum (**Mtpa**) run of mine (**ROM**) longwall mining operation, which commenced in 2012.

The Project Approval has subsequently been modified on a number of occasions. The environmental assessment for Modification 5 (Resource Strategies, 2015) (**MOD 5**), approved in December 2015, changed the mine geometry by reducing the number of longwall (**LW**) panels from 26 to 20, increased some LW panel widths and increased the production to 11 Mtpa of ROM coal until July 2031.

Modification 7, the most recent modification of the Project Approval, was approved on 23 November 2021. The environmental assessment for Modification 7 (Resource Strategies, 2021) (**MOD 7**) describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205[2]. The bord and pillar mining will occur concurrently with existing longwall operations and is scheduled to commence in 2022 for a period of approximately five years. There is no change to the previously approved longwall panels LW 203 to LW 205. The maximum ROM coal production rate of the concurrent operation remains within the approved limit of 11 Mtpa.

The Extraction Plan provides further details of the Narrabri Mine operations to date; a consideration of the applicable statutory requirements and the modifications to the Project Approval; and information relevant to the extraction of coal from pillar reduction panels CF 201 to CF 205 (hereafter referred to as **Panels 201 to 202**). The surface area predicted to be affected by the proposed secondary extraction of Panels 201 to 202 has been defined as the **Extraction Plan Area**.

The underground mining layout for Panels 201 to 202 is presented in Figure 1.1.

[1] For full details on the joint venture ownership, please refer to the introduction of the Extraction Plan.

[2] The pillar reduction panel naming 'CF' is an acronym for 'cut and flit'.

Source: Geoscience Australia (2011); NSW Spatial Services (2019)

LEGEND

— — Underground Mine Footprint

—E— Electricity Transmission Line (Constructed)

ONWARD CONSULTING

NARRABRI COAL MINE

Figure 1.1 : Underground Mining Layout for Panels 201 and 202

1.2 Purpose and scope

As required by Project Approval Schedule 6 Condition 2, this Rehabilitation Management Plan (**RMP**) for Panels 201 to 202 has been prepared in accordance with the NSW Department of Planning and Environment (**DPE**) *Draft Guidelines for the Preparation of Extraction Plans* (unpublished) (**Extraction Plan Guidelines**). It complies with Schedule 5 Condition 4(g) of the Project Approval, which states that, as part of the Extraction Plan and to the satisfaction of the NSW Resources Regulator, appropriate revisions are to be made to the Landscape Management Plan (**LSMP**) as required under Schedule 5 Condition 3. The LSMP must include an RMP, which is conditioned under Schedule 5 Condition 4, as described in section 1.4.1.

This RMP builds on the detailed Mine Subsidence Assessment prepared for Panels 201-205 by Ditton Geotechnical Services Pty Ltd (DGS, 2021) and describes the ongoing and future activities proposed to create a final landform that is similar to the pre-mining landscape, and pre-mining capability of the land. This RMP has amended the management domains for the mine site to be consistent with the current approved Mining Operations Plan (**MOP**) 1 December 2020 to 31 December 2023, and the *ESG3: Mining Operations Plan (MOP) Guidelines* (**MOP Guidelines**) (NSW Trade and Investment, Regional Infrastructure and Services - Division of Resources and Energy [DRE[3]], 2013).

1.3 Objectives

The objectives of this RMP are to:

- provide a description of the short- and long-term objectives for rehabilitation of Narrabri Mine;
- provide a detailed description of the measures that would be implemented to remediate predicted subsidence impacts under individual Extraction Plans;
- describe the short and long term measures that would be implemented to minimise environmental impacts of mining operations and to rehabilitate the Narrabri Mine site;
- describe the current and future rehabilitation monitoring program;
- describe the performance and completion criteria of the final rehabilitation of the mine; and
- describe the responsibilities for implementation of this RMP.

NCOPL will implement all practical measures to prevent and/or minimise any harm to the environment that may result from construction, operation or rehabilitation activities at the Narrabri Mine.

1.4 Statutory requirements

This RMP has been prepared in accordance with the applicable conditions and requirements of the Project Approval, EPBC 2009/5003, ML 1609 and all relevant legislation and guidelines as set out in the following sections. A full consideration of the applicable compliance requirements is provided in section 2 of the Extraction Plan.

1.4.1 Project Approval

Project Approval Schedule 5 Condition 4 requires NCOPL to prepare an RMP which must include:

(a) the rehabilitation objectives for the site;

[3] Now the Department of Regional NSW - Resources Regulator.

(b) a strategic description of how the rehabilitation of the site would be integrated with surrounding land use;

(c) a general description of the short- and long-term measures that would be implemented to rehabilitate the site;

(d) a detailed description of the measures that would be implemented to remediate predicted subsidence impacts under individual Extraction Plans;

(e) a detailed description of the measures that would be implemented to minimise environmental impacts of mining operations and to rehabilitate the site, including measures to be implemented for:

- managing remnant vegetation and habitat on site;
- minimising impacts on fauna;
- minimising visual impacts;
- conserving and reusing topsoil;
- controlling weeds, pest animals, and access;
- managing bushfires; and
- managing any potential conflicts between rehabilitation works and Aboriginal cultural heritage.

(f) detailed performance and completion criteria for the rehabilitation of the site;

(g) a detailed description of how the performance of the rehabilitation works would be monitored over time to achieve the stated objectives and against the relevant performance and completion criteria; and

(h) details of who is responsible for monitoring, reviewing and implementing the Plan.

In accordance with the supplementary note to Schedule 5 Condition 4, and in accordance with Condition 11 of Schedule 2, this RMP has been specifically revised for the extraction of Panels 201 to 202 however continues to be applicable to the whole Narrabri Mine. It is supported by the suite of other management plans that are appended to, and form part of, the Extraction Plan, in particular the Mine Closure Plan (**MCP**).

The Project Approval conditions directly relevant to this RMP have been presented in full in Table A1.1 in Attachment 1, together with a cross-reference where the requirements are addressed within this Plan.

Statement of Commitments

The Statement of Commitments for Site Operations and Management (**SoC**) is contained as Appendix 3 of the Project Approval. NCOPL has committed to implement a number of rehabilitation actions, as listed in Table 1.1. These are further addressed in sections 4 to 7 of this Plan.

Table 1.1 - Rehabilitation commitments

Desired outcome	SoC	Action	RMP reference
Decommission and remove the infrastructure and services no longer required for ongoing activities on the land of the Mine Site.	**4.1**	Confirm the proposed final land use of the Mine Site lands and identify the infrastructure and services to be retained to support this land use.	As part of the MCP for the mine.
	4.2	Demolish or reconstruct and remove infrastructure and services not required by the confirmed future land use	Section 5.2
The creation of a stable final landform on the Pit Top Area (and surrounding long-term	**4.3**	Stabilise all earthworks, drainage lines and disturbed areas no longer required for mine-related activities in order to minimise erosion and sedimentation, and to	Section 5.3

Desired outcome	SoC	Action	RMP reference
disturbance areas, i.e., ventilation shaft areas, Reject Emplacement Area and brine storage ponds), available for the proposed future use(s) of agriculture, and/or nature conservation.		reduce the visibility of the activities from adjacent properties and the local road network.	
	4.4	Provide a low maintenance, stable and safe landform that blends with the surrounding topography and which is commensurate with re-established agricultural land uses.	Section 5.3, 5.4 and 5.5
	4.5	Ensure any areas of disturbance that require profiling meet the requirements of the final landform.	Section 5.3
	4.6	Replace subsoil and topsoil over areas of disturbance in the same order and approximately same depths as it was removed.	Section 5.3
	4.7	Ensure the most appropriate crop/pasture species are planted in areas returned for agricultural use.	Section 5.5 and 5.6
	4.8	Conduct ongoing rehabilitation monitoring and maintenance throughout and beyond the operation.	Section 7
The progressive rehabilitation of disturbance associated with the Mining Area, i.e., gas drainage and temporary ventilation activities, to create a stable final landform available for the proposed future use(s) of agriculture, forestry and/or nature conservation.	**4.9**	Restrict areas of disturbance to the areas identified and marked in accordance with Commitments 1.1 to 1.5.	As part of the Biodiversity Management Plan (**BMP**) for the mine
	4.10	Remove gas drainage equipment and backfill and cap each remaining bore hole in accordance with the former NSW Department of Primary Industries -- Mineral Resources EDG01 guideline "*Borehole Sealing Requirements on Land. Coal Exploration*".	Section 5.2
	4.11	Allow water retained within the sump(s) to evaporate, excavate any consolidated drill cuttings and fines, remove the plastic liner and backfill each sump.	Section 5.3
	4.12	Respread previously stripped and stockpiled topsoil and vegetation over the backfilled sumps and other cleared areas.	Section 5.4
	4.13	Complete periodic inspections of the rehabilitated sites to confirm a return the vegetation of the surrounding landform.	Section 7
	4.14	(Unless required for future access to monitor or manage subsidence related impacts), close, cross-rip and respread previously cleared vegetation over access tracks.	Section 5.2 and 5.3
Prevent any noxious weed infestations.	**4.15**	Obtain certification from plant supplier/contractor that equipment imported to the Mine Site has been cleaned and is free of soil and vegetation.	As part of the BMP for the mine
	4.16	Undertake campaign weed spraying over the Pit Top Area and areas of surface disturbance of the Mining Area in consultation with the North West Local Land Services and/or the NSC.	Section 7
Minimise long term impact on flora and	**8.14**	Implement a weed management strategy, in consultation with the Livestock Health and Pest	Section 7

Desired outcome	SoC	Action	RMP reference
fauna on and around the Mine Site.		Authority and the Narrabri Shire Council weeds officer, for the retained or rehabilitated natural vegetation within the Mine Site.	
Minimise long term impact on flora and fauna on and around the Mine Site.	**8.15**	Implement a feral animal management program to lower the predator impact upon small terrestrial native species.	Section 7.3
	8.16	Inspect the sediment dams, evaporation ponds and brine storage ponds for fauna during the course of regular maintenance and operational inspections.	As part of the BMP for the mine
	8.17	Undertake regular reviews of the revegetation program to ensure it remains relevant.	Section 9.3
	8.18	Time clearing within woodland communities, where practicable, to avoid fauna breeding seasons.	As part of the BMP for the mine
	8.19	Undertake progressive and final rehabilitation across the Project Site to recreate a final land use of agriculture and native vegetation.	Section 2.1P

1.4.2 EPBC approval

The Narrabri Mine is subject to EPBC 2009/5003 issued under the EPBC Act. Approval Condition 5 states that in order to minimise potential impacts on EPBC Act listed threatened species and communities within the mine site, NCOPL must actively manage progressive disturbance of the mine site in accordance with an RMP for the life of the mine. The initial RMP was developed and implemented prior to any works commencing and in accordance with the NSW Director General's Assessment Report and approval conditions (26 July 2010), and this latest version of the Plan has been provided to the Commonwealth Department of Agriculture, Water and Environment (**DAWE**).

1.4.3 Mining lease

The original ML 1609 issued in 2008 has been amended to include a reference to Extraction Plans, removing the requirements for a Subsidence Management Plan. ML 1609 condition 7 states that disturbed land must be rehabilitated to a suitable/agreed end land use to the satisfaction of the Secretary. This is further addressed in section 3.2. There are no further specific ML conditions related to this RMP.

1.4.4 Extraction Plan Guidelines

There are no specific requirements identified in the Extraction Plan Guidelines that relate directly to this RMP, other than that the RMP needs to be revised to be consistent with the Extraction Plan. Evaluation and review are further addressed in section 8.3

1.5 Risk assessment

A subsidence risk assessment has been undertaken to identify the risks associated with subsidence at the Narrabri Mine. It builds on previous risk assessments completed for LW 101 to LW 110 and is presented as

Appendix K to the Extraction Plan. The updated risk assessment for Panels 201 to 202 has not identified any high-risk items and, as a result, risks associated with subsidence within the Extraction Plan Area for the Narrabri Mine have been assessed as low to moderate. The risks associated with rehabilitation are further discussed in section 3.

1.6 Consultation and approval

Schedule 5 Condition 3(d) of the Project Approval requires the LSMP to include an RMP (this Plan). Schedule 5 Condition 3(c) in turn states that the LSMP (including the RMP) is to be prepared in consultation with the Water group within DPE (generally referred to as **DPE Water**), the Biodiversity, Conservation and Science Division (**BCS**) within DPE and NSC, to the satisfaction of the Secretary and the Resources Regulator.

A draft (Revision B) of the LSMP (including the RMP and MCP) was provided for consultation on 3 December 2021. No comments were received on the RMP and MCP. The consultation correspondence is provided in Attachment 2 of the LSMP.

The overall consultation process required for the Extraction Plan by the Project Approval is detailed in section 1.9 of the Extraction Plan.

1.7 Access to information

In accordance with Schedule 6 Condition 10 of the Project Approval, the approved Extraction Plan and all appendices, audits and reports, and summaries of all monitoring data (where relevant) will be made publicly available on the WHC website. All information will be kept up to date.

Note that any printed copies of this RMP are uncontrolled.

2. Rehabilitation objectives

The overarching rehabilitation objectives are split into short-term and long-term objectives which aim to address the Project Approval conditions identified in section 1.4.1 and Attachment 1.

2.1 Short term

The short-term objectives for the Narrabri Mine are:

- to minimise clearing / vegetation disturbance to that required for operational activities;
- to progressively rehabilitate areas of disturbance no longer required for mining related operations;
- to apply soil to the final landform based on material availability and post-mining land use;
- to stabilise all earthworks, drainage lines and disturbed areas required for mine-related activities to minimise erosion and sedimentation;
- to control vermin, feral animals and weeds; and
- reduce the visibility of the activities from adjacent properties and the local road network.

2.2 Long term

The long-term objectives for the Narrabri Mine are to:

- decommission and remove all Project-related infrastructure not required for the future use of the site;
- remediate any land contaminated by accumulated salts or hydrocarbon spills/leaks;
- backfill the box cut and blend the final landform with the surrounding topography such that the visual impact of the post-mining landform is minimised;
- establish a low maintenance, geotechnically stable, safe and vegetated landform which blends in with the surrounding natural landscape;
- re-establish agricultural land to a comparable land capability to that of the pre-disturbance environment (e.g., land and soil capability (**LSC**) Class 3 in accordance with the Land Management Plan (**LMP**), provided as Appendix I to the Extraction Plan;
- restore ecosystem function including maintaining or establishing self-sustaining native ecosystems:
  - comprised of local native plant species; with
  - a landform consistent with the surrounding environment;
- repair and restore built features to pre-mining condition or equivalent;
- maintain the continuation and/or restoration of biodiversity and ecological integrity of areas affected by mining within ML 1609;
- provide habitat for fauna and corridors for fauna movement within the final landform;
- control vermin, feral animals and weeds;
- to monitor rehabilitation success in terms of physical and biological parameters;
- minimise the adverse socio-economic effects associated with mine closure, including the reduction in local and regional employment; and
- ensure public safety.

3. Rehabilitation risks

3.1 Environmental risk assessment

A risk assessment was undertaken in August 2015 which addressed all risks relating to rehabilitation at Narrabri Mine. The resulting rehabilitation risk register was reviewed and updated in August 2020, in accordance with the *Guideline: Rehabilitation Risk Assessment* (NSW Resources Regulator, 2021) and the WHC risk assessment process.

All rehabilitation risks were identified as low or moderate with the existing controls in place. No elements were categorised as being a high or critical risk. The predominant moderate risks associated with achieving successful rehabilitation include:

- poor quality or insufficient topsoil;
- loss or alteration to existing habitats due to subsidence, erosion, weeds and/or pests;
- alteration of drainage lines due to subsidence;
- contaminated land occurring onsite;
- loss of agricultural resources due to mining disturbance; and
- discharge of saline or contaminated water.

The Rehabilitation Risk Register is provided in Attachment 2, while the proposed risk management measures for the Narrabri Mine are further discussed in section 3.2. The trigger action response plan (**TARP**) for rehabilitation and mine closure is provided as section 3 of the LSMP.

3.2 Specific risks relating to rehabilitation

The following subsections describe aspects of the mining operation that have the potential to impact the quality and/or timing of rehabilitation.

3.2.1 Geology and geochemistry

Detailed geotechnical and geochemical characterisation of materials relating to the Reject Emplacement Area (**REA**) including emplaced reject material and potential capping soils has been undertaken by ATC Williams (2020) during the preparation of the *Narrabri Mine Reject Emplacement Area - Capping Assessment and Closure Design* (**REA closure design**). This assessment and the findings of the materials testing program are summarised as follows:

Reject material

- reject material tested can be classified as gravel (up to 150 mm size) with trace of sand and clay/silt fines;
- likely to be non-acid forming (**NAF**), with some level of enrichment, although not being a concern; and
- material found to possess low salinity, although this appears to increase through exposure and oxidisation. This is the primary geochemical concern due to the potential for the mixing and exposure of rejects impacting on capping soils in uncontrolled conditions.

The potential for salt generation and potential impact on capping soils is considered severe enough to take precautions in the REA capping design with capping recommendations as follows:

- materials in the capping layer to be generally fine grained and suitably engineered to minimise air voids and reduce permeability of the material and the potential for moisture infiltration into the emplacement;
- the thickness of the capping layer is to be sufficient and consistent to ensure no rejects are left exposed across the capped surface; and
- careful control on the preparation of the upper layers of reject will be necessary including limiting over-compaction of the reject material to minimise infilling of voids in the reject matrix with fines and possibly the use of an interim soil cover layer prior to the construction of the final cap.

Potential capping material

- sources of potential capping soils include in-situ borrow from the REA footprint, as well as existing soil stockpiles within the site;
- *in-situ* soils and a portion of soil stockpiles comprise silty clay soils that are of relatively high plasticity, and low permeability when compacted to an engineering standard. These materials are suitable for use in capping layer construction;
- remaining portion of the soil stockpile comprises coarse gravels. These materials would not be recommended for use as a fine-grained capping soil;
- *in-situ* and stockpiled soil material (both clay and gravel) are benign with low salinity, sodicity and sulphur content, and are classified as NAF;
- investigation of surface soils from the box cut area, as a reference site indicate that the capping soils used in this area comprise silty/sandy clay of medium to high plasticity and are generally non-dispersive. Similar physical characteristics to the soils sourced from the REA are expected, with the potential to replicate the performance of the capping profile in the box cut area subject to similar placement conditions, topsoil and revegetation conditions and similar batter slopes; and
- assessment of rock samples taken from the box cut area (being representative of rock sources from the site) highlight concerns with respect to the durability and integrity of the rock material under load and subject to exposure. The likelihood is that this material would break down to a sandy material with fines, and therefore would have no specific application as a soil ameliorant (to reduce erosion potential) or for erosion protection.

With the implementation of the above, the capping design, geology and geochemistry is considered a low risk to rehabilitation at Narrabri Mine.

3.2.2 Material prone to spontaneous combustion

Spontaneous combustion during operations is managed in accordance with a Spontaneous Combustion Major Hazard Management Plan and the Stockpile Management Plan. The potential for spontaneous combustion in the final REA landform was assessed during the preparation of the REA closure design. Samples of reject material from the REA were tested for spontaneous combustion potential and the test results indicate that the risk of spontaneous combustion in the form of fires or heating within the REA is low.

Notwithstanding, the adopted capping construction approach considers measures to minimise the potential for oxygen diffusion into the reject mass, which is a key trigger for spontaneous combustion. With the implementation of these management plans and capping design, spontaneous combustion is considered a moderate risk to rehabilitation at Narrabri Mine.

3.2.3 Material prone to generating acid mine drainage

As discussed in section 3.2.1, geochemistry testing was undertaken during the preparation of the REA closure design. Assessment of the acid forming potential of reject material showed that:

- total sulphur content is relatively low, with the majority of contained sulphur occurring as reactive sulphide; and
- all samples were classified as NAF.

In addition, assessments undertaken for the EA identified that the low sulphate concentrations in groundwater suggest that there is little concern for acid producing potential from groundwater inflows.

Acid mine drainage is considered a low risk to rehabilitation at Narrabri Mine. Notwithstanding, testing will be undertaken every five years throughout the mine life (or if conditions change) to determine the propensity of the material to generate contaminated leachate. The results will be reported in the Annual Reviews.

3.2.4 Erosion and sediment control

Given the Narrabri Mine is an underground mine, there are relatively few areas of exposed ground with potential for erosion and sedimentation. However, as identified in the REA closure design, erosion is a primary issue of concern regarding the rehabilitation of the REA. This relates to the potential for exposure of reject material due to local slumping or erosion of cover layers, with associated issues related to displacement or mobilisation of reject (and associated increased exposure to surface water infiltration).

Landform evolution and erosion modelling was undertaken as part of the REA closure design to assess the erosional stability of the proposed REA capping layer configuration. The erosion modelling showed that for the proposed landform to remain stable, establishment of vegetation is essential, with acceptable erosion rates for a vegetation cover of greater than 80%. Vegetation cover at or below 80% is predicted to result in rilling and gullying which will eventually cut through the proposed cover layer, exposing the underlying rejects.

A reliance of vegetation to provide erosion protection requires consideration of the following aspects:

- temporary erosion protection measures will be required to manage high erosion risk during the initial period post-construction and prior to establishment of vegetation, or while vegetation cover is developing but low;
- sound agronomy practices to facilitate the establishment and persistence of sufficient vegetation cover will be vital; and; and
- loss of vegetation through grazing, fire, or extreme weather events will reduce the effectiveness of the erosion protection.

Incorporation of a suitable rock fraction within the cover surface layer would also reduce the reliance on vegetation as the primary erosion reduction measure; however, as stated in section 3.2.1, the rock material assessed as part of this capping assessment is not considered suitable for this purpose.

Modelling outcomes also confirmed that stormwater runoff both from the plateau and down the batters of the REA will need to be managed to reduce erosion rates to acceptable levels and prevent potential for rilling and subsequent gully formation. Two specific management aspects are required in this regard:

- minimisation of uncontrolled runoff over the plateau edge reporting to the batter slopes; and
- reduction of effective slope lengths down the batter.

With the implementation of the capping design, erosional stability of the capping layer is considered a moderate risk to rehabilitation at Narrabri Mine.

3.2.5 Capping material availability

A recent material balance (August 2019) was undertaken in the REA closure design to assess capping material volume requirements based on the conceptual landform and proposed capping profile. The volume requirements were assessed against clay material availability (for use as capping material) based on existing stockpile volumes and potential borrow from the REA footprint. The results of this material balance indicated that there is sufficient soil material to construct the capping over the final landform, as presented in Table 3.1.

Table 3.1 - Capping material balance

Capping aspect	Capping material required		Capping material available	
	Slope area (m^2)	Volume (m^3)	Source area	Volume (m^3)
Plateau	146,000	58,000	Stockpiles	20,435
Batters	100,000	40,000	REA footprint stripping	90,000
TOTAL	**246,000**	**98,000**	**TOTAL**	**110,435**

Notwithstanding the above and the indicated volumes, availability of capping and topsoil material for rehabilitation is considered a moderate risk to rehabilitation at Narrabri Mine.

3.2.6 Soil types and suitability

The EA identified a variety of soil types across the mine site. Some of the soil types, particularly those derived from the Purlawaugh Formation, were identified as being moderately to highly dispersive, erodible and saline, and management of these soils is required where subsidence results in cracking, slope increases or occurs within drainage lines. Furthermore, the REA closure design found that the natural soils taken from the site as part of REA development, being potentially dispersive or sodic soils, were potentially erodible.

During topsoil stripping, all soils are handled as little as possible by ensuring the area to be stripped and the area of stockpiling are clearly identified. All topsoil is stripped and re-used in site rehabilitation, with the stripping and use of subsoil in rehabilitation or other works restricted to those soils identified as amenable for this purpose. Topsoil stockpiles do not exceed 2 m in height, while the subsoil stockpiles do not exceed 4 m in height.

The risk assessment identified poor topsoil quality (due to stockpile times, weeds, site conditions and management) as a moderate risk to reaching closure and relinquishing the lease. Inadequate volumes of topsoil were also identified as a potential risk to rehabilitation, due to limited stripping opportunities and/or poor recovery of topsoil from the visual bund. Should topsoil quality/quantity be inadequate for rehabilitation, NCOPL will source suitable ameliorants and topsoil alternates. With the implementation of the proposed management plans and procedures, soil types and suitability are not anticipated to pose a significant risk to rehabilitation at the site.

3.2.7 Mine subsidence

Mining activities at Narrabri Mine are currently undertaken using the longwall and bord and pillar methods of mining. Due to the underground nature of mining operations, the proposed mining method is not considered a significant risk to rehabilitation. As outlined in the Subsidence Predictions Report, provided as Appendix B to the Extraction Plan, the potential subsidence-related impacts include surface cracks, shearing and ponding.

Should subsidence impacts occur to surface features, remediation and rehabilitation will be undertaken in accordance with the existing approved Extraction Plans and future Extraction Plans that will be developed and approved in consultation with the affected landowner and relevant government agencies. Subsidence remediation and rehabilitation will be ongoing throughout the life of the mine.

3.2.8 Flora and fauna

Flora and fauna are not expected to pose a risk to the success of the rehabilitation at Narrabri Mine. Due to the underground mining methods, only small, disconnected areas of vegetation are required to be cleared for mining activities, and these will be rehabilitated to the pre-mining land use following mining.

Flora and fauna management will be undertaken as outlined in the BMP, provided as Appendix H to the Extraction Plan. Management of weeds and pest species are further described in sections 5.1.5 and 5.1.6 respectively.

4. Rehabilitation management strategy

4.1 Rehabilitation activity status

Various rehabilitation activities within ML 1609 have been undertaken, with a cumulative total of 111 ha of land reported to be under active rehabilitation at the end of 2020. In addition, the majority of disturbance within the exploration area (EL 6243) has been rehabilitated. Progressive rehabilitation activities have included:

- decommissioning of drill holes, gas drainage infrastructure and mine safety pre-conditioning drill pads;
- filling in sumps associated with drilling activities;
- grading landforms and re-spreading topsoil/subsoil;
- fertilising and seeding topsoiled areas; and
- weed and feral pest monitoring and management.

Rehabilitation and revegetation monitoring undertaken to date has been limited to inspections of roads and creeks impacted by subsidence, borehole sealing, water management structures, soil stockpiles, and seeded areas for evidence of instability/erosion or poor germination. This process will continue over the life of the mine, with the extent and nature of activities undertaken being consistent with the MOP, this RMP, and other relevant sub-plans to the Extraction Plan in accordance with the Project Approval. Rehabilitation and revegetation activities and inspections are documented utilising the rehabilitation procedures and checklists.

External activities, such as ongoing weed and feral pest monitoring and management, are documented via manual monitoring reports provided by the consultant performing the activities.

Future works will progress on removing houses and associated infrastructure on mine-owned land that are no longer required, or that have been affected by subsidence. Staged rehabilitation of the REA will progress as the landform develops, and in accordance with the REA Strategy and the MCP.

All exploration drill holes will be sealed following the completion of drilling and associated activities in accordance with Condition 17 of ML 1609 and relevant guidelines including the *Exploration Code of Practice: Rehabilitation* (Department of Regional NSW, Resources Regulator, 2021), and the *Guideline for Mineral Exploration Drilling; Drilling and Integrity of Petroleum Exploration and Production Wells* (NSW Department of Industry, Skills and Regional Development, Division of Resources and Energy[4], 2016).

4.2 Rehabilitation phases

The rehabilitation process can be described as a sequence of conceptual rehabilitation phases within each domain to achieve a final land use that is self-sustaining. These phases are in accordance with the MOP and are described in Table 4.1. The performance indicators and completion criteria for each phase are described in section 6. Figures A3.1, A3.2 and A3.3 in Attachment 3 provide an overview of the mine domains and rehabilitation phases. The final rehabilitation and post-mining land use (2036) is provided in Figure A4.1 in Attachment 4.

[4] Now the Department of Regional NSW - Resources Regulator.

Table 4.1 - Rehabilitation phases

Phase	Description	Quality assurance reporting
Active / operational	Activities undertaken during operations to enhance rehabilitation, such as salvaging and managing soil resources, salvaging habitat resources.	• inspections, reviews and reports to confirm operational activities support the rehabilitation objectives.
Decommissioning	The process of removing plant and equipment from active services and rendering the area safe.	**Phase 1 - Demolition** • documentation of mine and borehole sealing; • documentation showing all subsidence pegs have been removed; • inspections and demolition reports to confirm all infrastructure to be demolished has been removed; • documentation to confirm all remaining inert, unrecyclable wastes have been either taken to a licensed landfill or buried in the backfill of the box-cut in accordance with Resources Regulator requirements; • documentation to confirm all carbonaceous material has been removed from the surface of the site and disposed of in the box cut with at least 5m of inert cover; • certificates of disposal to confirm all hazardous materials have been removed from site; • phase 2 contamination assessment report for any contaminated areas have been remediated to an appropriate standard commensurate with the post mining land use; and • documentation to identify the future landowner responsible for the ongoing upkeep and management of any retained infrastructure.
Landform establishment	The process of shaping material into a desired land surface profile. This includes earthworks activities such as cut and fill, rock raking, water storage and drainage construction.	**Phase 2 - Landform establishment** • survey and preparation of as constructed drawings of final constructed slopes, landforms and water drainage structures; • geotechnical report completed by qualified person shows that the post-mining landform is stable and slopes are stable for agreed post mining land use; • documentation of any subsidence remediation in accordance with the extraction plan; and • documentation confirming the rea has been capped in accordance with specifications.

Phase	Description	Quality assurance reporting
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 soil and applying ameliorants.	**Phase 3 - Growth medium establishment** • maintenance of a topsoil inventory to document stripped, stockpiled and re-spread resources; • site records of re-spread topsoil, ameliorants, fertiliser etc.; • documentation confirming habitat features (hollow bearing logs, felled timber not mulched and large rocks) were salvaged during pre-stripping operations for re-use where practicable; and • soil testing results to confirm appropriate soil geochemical parameters for plant establishment.
Ecosystem and land use 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.	**Phase 4 - Ecosystem and land use establishment** • documentation of reseeding or planting activities undertaken; • soil testing results to confirm appropriate soil geochemical parameters for plant establishment and growth; and • site inspections of rehabilitated areas to identify any emerging threats to rehabilitation.
Ecosystem and land use sustainability	The process of applying management techniques to encourage an ecosystem to grow and develop towards a desired and sustainable post mining land use outcome. Incorporates features including species reproduction, nutrient recycling and community structure.	**Phase 5 - Ecosystem and land use sustainability** • inspections of erosion and sediment controls; • inspections to identify potential weed infestations; • documentation of rehabilitation monitoring; and • documentation of weed and feral animal management and eradication programs and follow-up inspections.
Land relinquishment	The completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mining tenement.	**Phase 6 - Land relinquishment** • final rehabilitation assessment and record of findings to ensure all objectives have been met; • completion and submission of *ESF2: Rehabilitation completion and notification of mine site closure* • records of meeting with the Resources Regulator to discuss the outcomes of the ESF2 rehabilitation and address any outstanding issues that may potentially exist; and • records of meeting with relevant Government agencies to obtain consensus that the necessary requirements have been fulfilled and that no further work is required.

4.3 Management domains

Primary and secondary domains have been defined in accordance with the methodology prescribed in the MOP Guidelines. As such, the following applies:

- **Primary domains (operational domains)** - are defined on the basis of land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics (i.e., during mining); and
- **Secondary domains (post mining land use domains)** - are defined as land management units characterised by a similar post-mining land use objective (i.e., following mining).

The primary and secondary domains are fully described in section 2 of the LSMP.

4.4 Domain rehabilitation objectives

The key rehabilitation objectives for the primary and secondary domains are defined in Table 4.2.

Table 4.2 - Domain rehabilitation objectives

Code	Domain	Domain rehabilitation objectives
Primary domains		
All		• The final landform will be suitable for the intended final land use, and blend into the surrounding landforms as far as practicable.
1	Infrastructure Area	• All mining infrastructure will be removed progressively, and the area rehabilitated when no longer required. • Mine openings (including former surface entries, adits, shafts and boreholes) will be sealed and rehabilitated in accordance with relevant regulatory requirements. • Box cut is backfilled, contour banks and diversion drains installed, and post mining land use shaped to a stable landform (slopes maximum 4°) • All inert/recyclable wastes have been either disposed at a licenced facility or buried in the backfilled box cut in accordance with the Resources Regulator requirements. • All land contamination/hazardous materials will be identified and appropriately remediated.
2	Tailings Storage Facility	Not applicable to Narrabri Mine
3	Water Management Area	• Water management structures in the final landform will be designed and constructed prior to disturbance, in accordance with “the Blue Book”[1]. • Final landform drainage has been designed and constructed to achieve long term stability and minimise erosion. • Accumulated salts in evaporation/storage ponds excavated and either placed within drifts or injected back into the goaf; • Sediment dams and associated water management structures will remain in place until the catchment is rehabilitated and discharge water quality is similar to comparable undisturbed landforms.
4	Reject Emplacement Area	• The REA will be rehabilitated progressively. The majority of the external batters of the REA will be formed generally to a grade of 11 degrees (5:1 H:V) with a maximum grade of 14 degrees (4:1 H:V) in the current north east batter. • The REA will be progressively capped with approximately 400 mm of subsoil/topsoil initially stripped from the emplacement area. • The REA will be revegetated using hydromulch (with tackifier) grass cover with species selection appropriate for soil properties and local climate conditions. • Stormwater management and erosion control structures will be installed in accordance with design specifications. • Contour banks and diversion drains will be used to direct water into stable areas or sediment control basins and discharge water quality is similar to comparable undisturbed landforms.

Code	Domain	Domain rehabilitation objectives
5	Stockpiled Material	• Topsoil stockpiles will be stabilised with sterile cover pasture crops to minimise weed infestation and retain soil biological health with no slumping or erosion. • Topsoil stockpiles will be constructed and managed to optimise physical, chemical and biological characteristics. • Stockpile areas will be rehabilitated progressively when material is removed for use elsewhere on-site. • Material from the visual bund moved the to the box cut to ensure a landform commensurate with the surrounding land.
7	Rehabilitation Area	• Rehabilitated areas will be maintained so that they are geotechnically stable and compatible with the surrounding landscape. • Rehabilitated areas will be maintained so that they are adequately drained and incorporate drainage structures designed and constructed generally in accordance with “the Blue Book”.
8	Underground Mining Area	• Subsidence does not exceed the subsidence predictions. • Areas affected by mine induced subsidence will generally have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e., no increased risk of landslip or mass slope failure. • Mine openings (including former surface entries, adits, shafts and boreholes) will be sealed and rehabilitated in accordance with relevant regulatory requirements. • Areas of surface ponding will either be remediated to enable drainage to occur (where there is a salinity risk) or retained in accordance with the requirements of section 5.5. • The pre-mining land and soil capability of the site will be maintained. • Erosion measures implemented to mitigate slumping and uncontrolled erosion occurring. • Drainage lines are stable and assessed as being long term stable (>3 years).
Secondary domains		
A	Industrial Infrastructure	Not applicable to this RMP
B	Water Management Area	• The final landform drainage will integrate with the surrounding catchments and will achieve long term geomorphic stability and minimise erosion. • Sediment dams identified for retention in the final landform will be decontaminated and preserved as clean water farm dams or water sources for native fauna. • All retained dams (for agricultural use) will meet water harvesting requirements and/or, if in a 'turkey's nest' setting, be supported by a pumping arrangement that is licensed (if necessary).
C	Rehabilitation Area - Grassland	Not applicable to this RMP

Code	Domain	Domain rehabilitation objectives
D	Rehabilitation Area - Pasture	• At least 1,630 ha of LSC Class 3 agricultural land will be reinstated on areas disturbed by mining. • Final landform will be safe, stable and adequately drained. • The REA will have slopes generally to a grade of 11° with a maximum grade of up to 14°. • The REA will be capped with approximately 400 mm of subsoil/topsoil initially stripped from the emplacement area. • All landforms will be free draining except where specific structures (i.e. dams) have been constructed for the storage of water as required for sediment and erosion control or some post mining land use. • Buildings, water storage, roads (except those used by the public) and other infrastructure have been removed.
E	Rehabilitation Area – Woodland (Existing)	• Areas affected by mine induced subsidence will have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e., no increased risk of landslip or mass slope failure. • Subsidence cracking will have naturally closed/filled or been actively remediated and revegetated. • Erosion mitigation measures will be applied. • Drainage lines are vegetated and/or stable (non-eroding).
F	Rehabilitation Area – State Forest	• Areas affected by mine induced subsidence will have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e., no increased risk of landslip or mass slope failure). • Subsidence cracking will have naturally closed/filled or been actively remediated and revegetated. • Erosion mitigation measures will be applied.
G	Rehabilitation Area - Rural Land	Not applicable to this RMP
H	Relinquished Lands	Not applicable to this RMP
I	Final Void	Not applicable to Narrabri Mine
J	Conservation and Biodiversity Offset Area (**BOA**)	• Approximately 1,168 ha of woodland BOA will be established on areas disturbed by mining. • Approximately 422 ha of woodland BOA will be established on areas not disturbed by mining. • Woodland Rehabilitation Areas will be comparable with adjacent undisturbed remnant native vegetation including areas. • A legally binding conservation covenant will be placed on the title of the BOA following the cessation of mining.

Note:

1.*Managing Urban Stormwater: Soils and Construction - Volume 1* (Landcom 2004) is commonly known as 'the Blue Book'.

5. Rehabilitation action plan

The management actions detailed below will be updated with each revision of the RMP as mining operations progress. Rehabilitation activities are generally undertaken 6-12 months following undermining of each underground panel.

5.1 Active/operational phase

The management actions during this phase are required to be ongoing throughout active mining to enhance rehabilitation outcomes. The actions, which are further addressed in the sections below, and in Attachments 6 and 7, include the following:

- conserving and reusing topsoil;
- salvaging habitat resource;
- managing remnant woodland, riparian and remnant vegetation;
- minimising impacts on fauna;
- controlling weeds, pest animals, and access;
- managing bushfires (refer to Attachment 6); and
- managing any potential conflicts between rehabilitation works and Aboriginal cultural heritage (refer to Attachment 7).

Visual impacts will be minimised through the collective progressive rehabilitation actions. The activities listed above are applicable to all domains within the ML.

5.1.1 Conserving and reusing soil

The following measures will be implemented to conserve and reuse topsoil and subsoil:

- all soils within the areas to be disturbed will be stockpiled in wind rows immediately adjacent to the area of disturbance;
- topsoil stockpiles are to be created no higher than 2 m and with slopes no greater than 2:1 (H:V) to minimise soil erosion;
- sub-soil stockpiles are to be created no higher than 3 m with slopes no greater than 2:1 (H:V) to minimise soil erosion;
- sedimentation controls including catchment banks, silt-stop fencing, or straw bales will be placed immediately down slope of any soil stockpiles and will be maintained until such time as a stable vegetation cover over the stockpile is achieved;
- soil stockpiles will be left with a roughened surface and those stockpiles to be retained for more than three months that do not have a naturally established vegetation cover will be seeded with a selection of pasture species including fast growing, non-persistent cover species like triticale, ryecorn or millet and perennial species such as phalaris, cocksfoot, perennial rye and sub clover;
- if unacceptable weed generation is observed on soil stockpile areas, a weed control program will be implemented; and
- following stockpile construction, the operation of machinery on the topsoil and sub-soil stockpiles will be avoided in order to prevent compaction and maintain soil aggregation.

5.1.2 Salvaging habitat resources

The clearance of individual trees in the Pit Top Area as part of Stage 1 has been minimal. The clearance of trees as part of Stage 2 is associated with the construction of infrastructure, completion of drilling activities and borehole construction associated with pre- and goaf gas drainage. Vegetation clearing and habitat protection works are to be performed in accordance with the tree clearing protocol detailed in the BMP, provided as Appendix H to the Extraction Plan.

5.1.3 Managing remnant woodland and riparian vegetation

Management measures for impacts on vegetation include the implementation of weed control measures (refer to section 5.1.5), the preservation of stags (dead trees) and the planting of endemic plant species. Active planting should use flora species characteristic of the particular vegetation community and will be of regional providence. Planting methods and species are to be consistent with section 5.5.

During the establishment of drilling and borehole construction associated with the pre-mining and goaf gas drainage, the location of disturbance will be determined in such a way as to minimise the amount of disturbance to remnant vegetation, threatened flora habitat and threatened fauna habitat wherever practically possible.

Disturbance works associated with drilling and borehole construction will be undertaken within their defined impact area and clearly marked to avoid any unnecessary impact on adjacent remnant vegetation. Once these gas drainage activities are completed, each site will no longer be needed and therefore can be rehabilitated such that the final landform and final land use is comparable to that of the surrounding land within each management area (i.e., remnant vegetation management area should be rehabilitated to the associated vegetation communities).

As a requirement of the Project Approval, an offset strategy has been developed for Stage 1 and Stage 2, which incorporates the protection and management of 422 ha of onsite offsets. Appropriate management of woodland areas is also necessary on the basis that at the end of the mine life, an area of 1,168 ha of woodland will be added to the offset area for subsequent management for biodiversity purposes. As indicated within the Biodiversity Offset Strategy, specific Offset Area Management Plans have been developed to guide subsequent management of these areas.

There are several aspects to the management of remnant vegetation on site, including:

- fencing to exclude stock, public access and machinery;
- control of weeds; and
- control of pest animals.

Monitoring of vegetation during longwall mining will be in accordance with the Extraction Plan BMP.

5.1.4 Minimising impacts on fauna

The impacts on fauna will be minimised through the implementation of the measures detailed in section 5.1.2 and section 5.1.3, in conjunction with the monitoring conducted in accordance with the Extraction Plan BMP.

5.1.5 Weeds

The ecological assessment undertaken for the Stage 1 and Stage 2 EA, as well as several site visits for previous Extraction Plans, identified 93 weeds species (Attachment 5). Table 5.1 lists weeds that have been identified to be a risk to rehabilitation success.

Table 5.1 - Priority weeds

Scientific name	Common name
Bryophyllum delagoense	Mother of millions
Carthamus lanatus	Saffron thistle
Cenchrus incertus	Innocent burrgrass
Cenchrus longispinus	Spiny burrgras
Chondrilla juncea	Skeleton weed
Eragrostis curvula	African lovegrass
Hyparrhenia hirta	Coolatai grass
Lycium ferocissimum	African boxthorn
Opuntia spp.	Prickly pear
Oxalis corniculata	Creeping oxalis
Paspalum dilatatum	Paspalum
Salvia reflexa	Mintweed
Sclerolaena birchii	Galvanised burr
Solanum elaeagnifolium	Silver-leaved nightshade
Sorghum halepense	Johnson grass
Xanthium spinosum	Bathurst burr
Xanthium occidentale	Noogoora burr

As required by SoC 4.16, NCOPL are to undertake campaign weed spraying over the Pit Top Area and areas of surface disturbance of the Extraction Plan Area in consultation with the North West Local Land Services and/or the NSC. In addition, SoC 8.14 requires NCOPL to implement a weed management strategy, in consultation with the North West Local Land Services and the NSC weeds officer, for the retained or rehabilitated natural vegetation within the Mine Site.

The control of weeds will continue for the life of the mine. Section 7 details the weed monitoring and control program.

5.1.6 Pest animals

In accordance with SoC 8.15, NCOPL are to coordinate a routine monitoring program designed to identify the presence and abundance of pest animals across ML 1609. Annual monitoring will assist NCOPL to identify the appropriate resources and timing for control. Monitoring and control will adopt the relevant methodologies detailed in the 2018 DPI publication *Ecology and Management of Vertebrate Pests in NSW*.

Nine pest fauna species (two birds and seven mammals) were identified in the Stage 2 EA, these are:

- *Acridotheres tristis* (Common myna)
- *Sturnus vulgaris* (Common starling)
- *Canis familiaris* (Dog)
- *Capra hircus* (Goat)
- *Lepus europaeus* (Brown hare)
- *Mus musculus* (House mouse)
- *Rattus rattus* (Black rat)
- *Sus scrofa* (Pig)
- *Vulpes vulpes* (Fox).

NCOPL will engage qualified and experienced feral pest contractors that hold appropriate pesticide accreditation in accordance with the *Pesticides Act 1999* (NSW) or Firearm Licence under the *Firearms Act 1996* (NSW). NCOPL will ensure contractors provide copies of their accreditation. The control of pest animals will continue for the life of the mine. Section 7 details the feral pest monitoring and control program.

5.1.7 Access

Access to the ML will only be allowed for authorised personnel and machinery. Actions to be undertaken to prevent unauthorised access include:

- installation of signage at the entry of the mine site access road (intersection with the Kamilaroi Highway) indicating that authorised personnel only are permitted on site;
- installation of signage on all boundary fencing indicating that the site is an active mine and indicating that unauthorised access is not permitted;
- all visitors and contractors are required to sign in when arriving on site;
- utilisation of a system of inductions for all staff;
- exclusion of machinery along Kurrajong Creek Tributary 1 and remnant vegetation areas without approval from the Environmental Superintendent; and
- visitors and personnel not inducted will be required to be accompanied by an inducted person at all times.

These actions will be maintained for the life of the mine.

5.2 Decommissioning phase

The Decommissioning Phase encompasses all works required to prepare land for rehabilitation, including removal of any unnecessary built infrastructure, foundation and hardstand materials, services, and equipment and materials including waste and contamination. Activities associated with Domain 1 include the demolition of:

- access tracks;
- Namoi River water pipeline;
- boreholes and drill sites (including mine safety pre-conditioning drill sites);
- vent shafts and mine entries;

- site services;
- subsidence pegs;
- foundations and pavements; and
- waste removal.

Exploration boreholes and drill sites will be decommissioned where they are not required for long term monitoring or future geophysics. As discussed in section 4.1, boreholes will be sealed to meet Condition 17 of ML 1609, the *Exploration Code of Practice: Rehabilitation* (DPE, 2015), and the *Guideline for Mineral Exploration Drilling; Drilling and Integrity of Petroleum Exploration and Production Wells* (DRE, 2016). The surface infrastructure area will be contoured to slopes between 1-4% or equivalent to the pre-mining topography. As detailed in Table 5.2, these areas will then be stabilised by sowing a pasture seed mix relevant to the season of planting, with a typical fertiliser application rate.

All other facilities that are no longer required will be progressively removed and the area rehabilitated.

5.3 Landform establishment phase

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 ML 1609 is shown in Figure A2.1 of Attachment 2 of the MCP. Landform establishment will primarily be associated with filling in the box cut and capping and shaping the REA.

Domain 1 - Infrastructure Area

Landform establishment activities associated with this domain include:

- removal of water retained within the sump(s) adjacent to each borehole/drill site by pump truck for reuse or disposal or allow to evaporate over time;
- consolidated drill cuttings and fines will be excavated, and the sump backfilled using consolidated drilling spoil stockpiled during the bore construction phase;
- any upstream diversion banks or downstream catch banks will be pushed over and profiled to natural surface level. Where cut and fill works were required, these areas will be re-excavated to return the site to its natural slope;
- access tracks constructed to access each drainage site will be progressively closed and rehabilitated (unless required for future access to monitor or manage subsidence-related impacts). The tracks will be ripped using the tynes of a bulldozer (or similar) and previously cleared topsoil and vegetation (if any) will be pushed over the ripped surface. These areas will then be regraded and trimmed to make a landform that is consistent with the surrounding topography; and
- regrading will be such that it will enable the free drainage of surface runoff from the site.

Although all properties within the ML are owned by NCOPL, should impacts to infrastructure occur on properties not owned by NCOPL, these structures would be repaired or replaced by NCOPL.

Domain 3 - Water Management Area

Water management structures such as contour banks, diversion drains, or re-established drainage lines will be constructed with longitudinal gradients which permit the transfer of water at non-erosive velocities (e.g., 1:200 (V:H)) (where practicable). Consequently, specialised rehabilitation treatments will generally not be required. No flumes are required due to limited heights of any embankments constructed. However, in the event that unacceptable levels of erosion are observed, specialised treatments such as jute meshing, or rock lining will be implemented.

Domain 4 - Reject Emplacement Area

The REA will be progressively rehabilitated by progressively capping with slopes up to 14 degrees. Each cell will be constructed to a nominated height of 15 m.

Domain 8 - Underground Mining Area

Subsidence remediation will be undertaken over the underground mining area progressively and as required:

- It is expected that natural processes such as wind, water and soil movement will infill many of the cracks that develop as subsidence occurs. Notwithstanding this, inspections within the cracking zones will occur during and for a period of 12 months following the mining of each longwall panel to identify the occurrence of cracks. Where natural processes have not filled each crack, ripping or grading to infill the crack will be undertaken where necessary and as follows:
  - for smaller width cracking, the surface would simply be ripped to allow the cracks to be filled in; and
  - for significant surface cracks that cannot be filled with surface ripping or grading, these are to be filled using subsoil stockpile material from stockpiles maintained at nearby gas drainage or ventilation sites, or material from within the footprint of the REA.
- If ponding or flow re-direction occurs, unless the ponding significantly affects downstream flows and vegetation, no work will be undertaken. However, should ponding significantly affect flow or vegetation, advice will be sought from a qualified geomorphologist so that the most effective way of re-establishing more natural flow patterns is identified;
- Areas of ponding that are identified will be sampled monthly to test how water salinity changes. This monitoring frequency can then be adjusted, as dictated by the results. Over time, regular water testing will build up a general trend for the condition of the water being collected. Further investigation can then be started, should these trends change during the mining operations;
- If little vegetation of significance is impacted and water quality analysis confirms no increase in salinity, the ponding would be left to “self-correct” over time. The continual action of erosion and sedimentation without mitigation measures is likely to self-correct the geomorphic characteristics of the waterways over time;
- If important environmental features are impacted (i.e., riparian vegetation, Endangered Ecological Community or archaeological deposits) or water quality analysis indicates an increase in salinity, the ponding will be assessed, and remediation options will be developed to protect the affected environmental features and prevent saline water discharging downstream; and
- Stabilisation actions to remediate slope stability and erosion will be undertaken in the unlikely event of large-scale slope instability or erosion. Deep sub-surface drainage trenches would be installed and catch drains would be constructed along slope crests so that surface run-off is controlled. Stabilisation works would be undertaken along sections of bank which are damaged or steeply eroded. These works would be conducted in accordance with the Erosion and Sediment Control Plan which forms part of the Water Management Plan for the site.

5.4 Growth media development phase

Growth medium development encompasses activities to reinstate soils with the initial physical, chemical, and biological characteristics required to establish the desired vegetation community.

Domain 1 - Infrastructure Area

- the surface of the backfilled sumps will be covered with the topsoil and subsoil stripped and stockpiled during site establishment, and lightly scarified;
- upstream diversion banks or downstream catch banks will be ripped or lightly scarified. Where cut and fill works were required, these areas will be re-excavated to return the site to its natural slope. This, and the remaining cleared surfaces of the drill site, will be ripped or lightly scarified and the remaining stockpiled soil;
- topsoil:
  - reuse topsoil by replacing it back in the appropriate areas and order and in a manner that resembles the surrounding landscape;
  - before the topsoil is spread, the ground will be scarified along the contour to a depth of 50 to 100 mm to break up any hard setting surfaces and to provide a good bond between the re-spread material and sub-soil; and
  - topsoil will be spread to a minimum depth of 150 mm. The re-spread topsoil will be ripped to a depth of 300 mm along the contour with rip lines being a maximum of 1 m apart.

Domain 4 - Reject Emplacement Area

Following landform establishment, the REA will be progressively capped with previously stripped subsoil, topsoil and mixed with a competent rock. The soils will be treated with gypsum and the area will be hydro-mulched and watered to establish cover crop. On completion of each cell the top surface would be profiled prior to seeding. Additional contours will be incorporated within the design to limit surface water flows.

Domain 8 - Underground Mining Area

Any ground disturbance indicated by surface cracking caused by subsidence will be progressively rehabilitated. Following subsidence crack remediation, the area will be topsoiled if required, and ripped as outlined above, prior to revegetation.

5.5 Ecosystem and land use establishment

Ecosystem establishment includes activities to establish the desired floristic composition (species diversity and density) and habitat features.

Domain 3/B - Water Management Area

In the event that unacceptable levels of erosion are observed, fast growing species identified as having a particular soil conservation application will be planted around water management structures. The planting of trees and other vegetation around some of the water management structures will enhance filtration ability of these structures and surrounding areas and minimise the potential for erosion, as well as encouraging their use by native fauna.

Domain 7/D - Rehabilitation Area – Pasture

Sites located within pastureland will be rehabilitated to the appropriate agricultural land class, sown with a pasture seed mix relevant to the season of planting, with a typical fertiliser application rate as specified in Table 5.2. The land and soil capability classification (**LSC**) gives an indication of the land management practices that can be applied to a parcel of land. The LSC Class 3 is the predominate class above Panels 201 - 202 in accordance with the LMP.

Table 5.2 - Pasture species seed mixes

Summer			Winter		
Pasture species	**Rate (kg/ha)**	**Fertiliser**	**Pasture species**	**Rate (kg/ha)**	**Fertiliser**
Grasses					
Bombasti panic	1 - 2	Di-ammonium Phosphate 250kg/ha	Phalaris (Sirolan or Holdfast)	1 - 2	Di-ammonium Phosphate 250 kg/ha
	2 - 4		Wallaby Grass	0.3 - 1	
Purple pigeon grass	1 - 2				
Legumes[1]					
Subterranean clover	4 - 5	-	Subterranean clover	4 - 5	-
			Barrel (Sephi) medic	2 - 4	-
			Snail (Sava) medic[2]	3 - 5	-
			Woolly pod vetch	4 - 6	-
			Serradella (Elagara)	1 - 2	-
			Lucerne	0.5	-

Notes:

1. Inoculated with appropriate rhizobia.
2. Specific soil conservation application

Domain 7/E (Rehabilitation Area - Woodland) / Domain 7/F (Rehabilitation Area - State Forest) / Domain 9/J (Rehabilitation Area - Biodiversity Offset Area)

Sites located within woodlands will be rehabilitated using endemic species to the corresponding vegetation communities that exist immediately adjacent to each site. Each site will be rehabilitated with canopy, mid-storey, shrub and groundcover species endemic to the vegetation communities as specified in Table 5.3). Any ground disturbance indicated by surface cracking caused by subsidence will be seeded (if necessary) or covered with available leaf litter or broken vegetation. No seeding is considered necessary for access tracks as natural regeneration of vegetation from seed in the topsoil and the surrounding environment is expected. However, in the event that natural regeneration does not adequately establish within 3 months of ripping, the site will be seeded as appropriate.

Table 5.3 - Woodland and riparian species

Vegetation community	Dominant canopy species	Dominant mid-story species	Dominant shrub species	Dominant groundcover species
Brown Bloodwood / Pilliga Box Woodland	*Corymbia trachyphloia*	*Callitris glaucophylla*	*Calytrix tetragona*	*Pomax umbellata*
	Eucalyptus pilligaensis	*Acacia homalophylla*	*Phebalium squamulosum*	*Eragrostis brownii*
	Eucalyptus fibrosa	*Acacia harpophylla*	*Acacia burrowii*	*Dianella revoluta*
			Persoonia sericea	*Microlaena stipoides*
			Allocasuarina diminuta	*Goodenia hederacea*
Callitris Forest	*Callitris glaucophylla*	-	-	*Eragrostis cilianensis*
				Goodenia rotundifolia
				Aristida benthamii
				Austrostipa aristiglumis
				Cleistochloa rigida
Inland Grey Box Woodland (EEC)	*Eucalyptus microcarpa*	*Geijera parviflora*	*Geijera parviflora*	*Aristida benthamii*
	Eucalyptus populnea	*Callitris glaucophylla*	*Maytenus cunninghamii*	*Solanum ferocissimum*
	Eucalyptus blakelyi	*Casuarina cristata*	*Acacia homalophylla*	*Austrostipa ramosissima*
		Capparis mitchellii		*Austrostipa verticillata*
				Chrysocephalum apiculatum
Riparian Forest	*Casuarina cunninghamiana*	*Eremophila mitchellii*	*Geijera parviflora*	*Aristida benthamii*
	Casuarina cristata	*Myoporum montanum*	*Acacia penninervis*	*Austrostipa aristiglumis*
	Eucalyptus populnea		*Notelaea microcarpa*	*Austrostipa ramosissima*
	Eucalyptus microcarpa			*Bothriochloa decipiens*
				Cyperus gracilis

The rehabilitation of canopy, mid-storey, shrub, and groundcover species should reflect densities that occurred pre-disturbance. At a minimum, rehabilitation of canopy species should reflect the number of trees identified for clearance during pre-clearing survey or, as a minimum, count per m^2 as follows:

- canopy – 1 canopy planting per 10 m^2
- mid-storey - 1 mid-storey planting per 5 m^2
- shrub - 1 shrub planting per 1 m^2
- groundcover - 4 groundcover plantings per 1 m^2

All plants will be planted as tube stock. The use of tree guards will be determined at the time of planting depending upon the predicted level of grazing and/or weather conditions.

5.6 Ecosystem and land use sustainability phase

The ecosystem sustainability phase represents those activities required to develop sustainable ecosystems that have characteristics comparable to similar undisturbed vegetation associations in the area.

All domains

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

- ongoing environmental management to minimise risks to rehabilitation;
- inspection and monitoring, comparing specific ecosystem characteristics such as soil profile development, floristic composition and structure and faunal diversity and abundance with the characteristics of appropriate control 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 sustainability phase until it can be demonstrated that rehabilitation areas have met all conditions for relinquishment.

5.7 Access tracks

Access tracks located throughout the ML and specifically within the infrastructure management area of Domain 1 will be progressively closed and rehabilitated. Tracks will be ripped, topsoil replaced (in accordance with section 5.3) and vegetation pushed over the ripped surface. Natural revegetation will be allowed to occur in these areas, however if this is not successful within 3 months during peak growing periods (spring and summer) and 6 months during slower growing periods (autumn and winter), the site will be seeded, using species endemic to adjacent remnant vegetation or agricultural land class (Table 5.2 and 5.3).

5.8 Contaminated land

The EA identified no pre-existing contaminated or polluted land within ML 1609 and, as such, no specific management controls or monitoring procedures are required under the Project Approval. The greatest risk for the contamination or pollution of land as a result of the mine is associated with the potential for contaminated water and/or hydrocarbon spills and leaks. The following hydrocarbon management measures are to be implemented:

- all water from wash-down areas and workshops is to be directed to oil separators and containment systems;
- all storage tanks are to be either self-bunded or partitioned with an impermeable bund with a capacity to contain a minimum 110% of the largest storage tank capacity;
- all hydrocarbon products are to be securely stored; and
- equipment refuelling is to occur at the bunded fuel farm in the pit top area. any refuelling activities in the field are to be in accordance with site procedures and the implementation of adequate controls to minimise the risk of spills.

In the event of a internally reportable hydrocarbon spill, an Incident Report Form will be completed, and the Pollution Incident Response Management Plan (**PIRMP**) consulted and implemented where triggered. The affected area will be inspected after rectification to ensure there is no ongoing effect on the land that could prevent it from being successfully rehabilitated.

Contamination monitoring activities and mitigation measures will be reported in the Annual Review as required.

6. Performance indicators and completion criteria

The performance indicators and completion criteria have been developed based on the rehabilitation phases and associated management domains. The completion criteria are objective target levels or values assigned to a variety of indicators which can be measured to demonstrate progress and ultimate success of rehabilitation. As such, they provide a defined end point, at which point in time rehabilitation can be deemed successful and the lease relinquishment process can proceed.

The completion criteria may be subject to refinement as mining operations progress. The achievement (or otherwise) of the completion criteria will be monitored and reported within the annual reports to be submitted to the relevant Government departments and agencies.

The performance indicators and completion criteria for each phase are detailed below in the following tables:

- Table 6.1 - Phase 1 - Active/operational and decommissioning;
- Table 6.2 - Phase 2 - Landform establishment;
- Table 6.3 - Phase 3 - Growth media;
- Table 6.4 - Phase 4 - Ecosystem and land use establishment;
- Table 6.5 - Phase 5 - Ecosystem and land use sustainability; and
- Table 6.6 - Phase 6 - Land relinquishment.

Table 6.1 - Phase 1 - Active/operational and decommissioning completion criteria

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
All domains					
Public safety	Site security	Appropriate security measures (e.g., adequate fencing) has been implemented (where required) prior to commencing decommissioning and demolition works. A full post-mining site security Risk Assessment has been undertaken and all controls identified to mitigate any risk have been fully implemented.	No	Not commenced	Risk assessment
Domain 1 – Infrastructure area					
Infrastructure (other than that remaining in the final landform) will be decommissioned progressively as plant, equipment and infrastructure becomes obsolete.	Demolition of infrastructure	All demolition work has been carried out in accordance with AS2601-2001: The Demolition of Structures or its latest version.	No	Not commenced	Demolition reports
		All surface infrastructure has been demolished and removed from the site	No	Commenced (ongoing)	Inspection report
	Access tracks	Temporary access tracks have been ripped, topsoiled, and revegetated as soon as possible after they are no longer required for mining operations.	No	Commenced (ongoing)	Inspection report
	Namoi Water Pipeline	The pipeline/s between the mine site and the Namoi River has been removed from the underground trenches and recycled. The disturbance areas are rehabilitated.	No	Not commenced	As constructed reports
	Boreholes and drill sites, and mine safety pre-conditioning drill sites	All boreholes have been backfilled and capped in accordance with Condition 17 of ML 1609, *Exploration Code of Practice: Rehabilitation* (DPE, 2015), and the *Guideline for Mineral Exploration Drilling; Drilling and Integrity of Petroleum Exploration and Production Wells* (DRE, 2016).	No	Commenced (ongoing)	Inspection report / borelogs
	Vent shafts and mine entries	Shafts and mine entries to be filled and capped in accordance with Resources Regulator *Guidelines for the Permanent Filling and Capping of Entries to coal seams* (MDG 6001).	No	Not commenced	Inspection report
	Site services	All site electricity and telecommunication services not required for the post mining land use have been isolated, disconnected and terminated to make safe. Inspection pits and junction boxes for underground services have been sealed. Underground services have been made safe and left buried in the ground. Overhead power lines have been removed.	No	Not commenced	Decommissioning report/ Inspection report
	Subsidence pegs	All subsidence pegs removed in consultation with Resources Regulator.	No	Commenced (ongoing)	Photographic evidence / Correspondence with Resource Regulator
	Foundations and pavements	All concrete footings, foundation pads and pavements have been dug up, crushed to make an aggregate and utilised across the site or sold for some other beneficial reuse.	No	Not commenced	As constructed reports
	Waste	All remaining inert, unrecyclable wastes have been either taken to a licensed landfill or buried in the backfill of the box-cut in accordance with Resources Regulator / EPA requirements.	No	Not commenced	Certificate of disposal / Inspection report
Ensure the site is safe and free of hazardous materials	Carbonaceous material	All carbonaceous material has been removed from the surface of the site and disposed of in the box cut with at least 5m of inert cover.	No	Not commenced	Phase 2 contamination assessment report
	Hazardous materials	All hazardous materials (e.g., petroleum, chemicals and explosive products) that are no longer required have been removed from site, verified by Certificates of disposal.	No	Not commenced	Certificate of disposal

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
	Contamination	A Phase 2 contamination assessment has been undertaken and any contaminated areas have been remediated to an appropriate standard commensurate with the post mining land use.	No	Not commenced	Phase 2 contamination assessment report
Domain 3 - Water management areas					
Mine water dams and sediment dams are decontaminated prior to removal or re-use as retained clean water dams in the final landform.	Brine Storage Dams	Brine storage dams have been de-watered, and the stored brine pumped back into the goaf areas and remaining gate roads of the completed longwall panels. The high-density polyethylene (HDPE) plastic liner of each dam has been removed and transported to a waste disposal facility, supported by records.	No	Not commenced	Inspection report/Certificate of disposal
	Removal of water management structures not required in final landform	All water management structures that are not required as part of the post-closure land use have been removed.	No	Not commenced	Inspection report
	Box Cut Water Management System	The internal water management system in the box cut has been de-watered and any contaminated water has been appropriately treated or taken from site for treatment, supported by records.	No	Not commenced	Xxx/water sample records
	Hazardous materials	Accumulated salt in the evaporation/storage ponds has been excavated and either placed within the drifts of box-cut prior to backfilling or reinjected back into the goaf, supported by records.	No	Not commenced	
	Pumping infrastructure	All ancillary equipment including pumps and pipelines have been removed and services terminated.	No	Not commenced	Inspection report

Table 6.2 - Landform establishment completion criteria

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
All domains					
Final landform will be suitable for the intended final land use, and blend into the surrounding landforms as far as practicable.	Safety	A risk assessment has been undertaken in accordance with relevant guidelines and Australian Standards and risks reduced to levels agreed with the stakeholders.	No	Not commenced	Risk Assessment
	Landform	The rehabilitated landform is free draining, low maintenance, stable and safe, and blends with the surrounding topography (as determined by specialist engineering and visual amenity assessments).	Yes	Not commenced	Specialist assessment reports
	Stability	All earthworks, drainage lines and disturbed areas no longer required for mine-related activities have been stabilised in order to minimise erosion and sedimentation, and to reduce the visibility of the activities from adjacent properties and the local road network.	No	Ongoing	Specialist assessment reports
	Soil moisture and nutrient distribution (electromagnetic mapping)	Identified areas of electromagnetic mapping change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change. Site specific management report prepared, and recommendations implemented where necessary.	No	Ongoing	Specialist assessment report
	Erosion	Visual inspection confirms no active sheet, gully, or rill erosion >200mm deep as determined by specialist assessment.	Yes	Not commenced	Inspection report
Domain 1 – Infrastructure area					
Final landform will be suitable for the intended final land use, and blend into the surrounding landforms as far as practicable.	Box cut	The box-cut has been backfilled using material recovered from the perimeter amenity bund and other inert material removed during demolition. The surface has been shaped to restore continuity with the surrounding landscape.	No	Not commenced	Inspection report/ Specialist assessment report
	Pit top	The post mining landform has been shaped to create a stable surface with slopes at a maximum of 4 degrees.	No	Ongoing	Specialist assessment report
	Drainage	Contour banks and diversion drains have been installed to direct water into stable areas or sediment control basins	Yes	Not commenced	As constructed reports
Domain 3 - Water management areas					
Safe, stable, adequately drained post mining landforms consistent with the surrounding landscape.	Final landform drainage design	Surface water management structures such as contour banks, diversion drains, and settlement ponds required to provide permanent, long-term stable water flow and storage have been constructed.	Yes	Not commenced	As constructed reports
		Final landform drainage structures including drains, banks, drop structures and dams have been designed and constructed in accordance with Blue Book requirements.	Yes	Not commenced	As constructed reports
	Geomorphic stability	Geotechnical report completed by qualified person shows that the post-mining landform is stable, and slopes are stable for agreed post mining land use.	No	Not commenced	Geotechnical report
Water quality is appropriate for final land use	EPL discharge criteria	Surface water is non-polluting. All discharge water quality criteria (pH, TSS, EC, oil/grease) complies with EPL 12789.	No	Not commenced	Water sample reports/Inspection reports
	Leachate	No water is observed leaching from dams that will remain in the final landform.	No	Not commenced	Inspection reports
Domain 4 - Reject emplacement area					
Final landforms are shaped appropriately for final land use	Maximum slope and height	The REA has been capped with the previously stripped subsoil and topsoil with slopes up to 14° and maximum 15m height.	Yes	Not commenced	Specialist assessment report
	Final landform shaped and rehabilitated	Geotechnical report completed by qualified person at shows that the post-mining landform is stable, and slopes are stable for agreed post mining land use.	No	Not commenced	Geotechnical report
	Slumping or uncontrolled erosion	There is an absence of slumping or uncontrolled erosion with rills < 200 mm deep	Yes	Not commenced	Inspection reports

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
Final landforms, including slopes and drainage will be designed to be safe, stable and non-polluting.	Capping depth	Landform is capped with approximately 400 mm of capping material comprising a rocky soil (or rock mulch), utilising the available topsoil/subsoil reserves on-site	No	Not commenced	Inspection reports
	Visual amenity	The REA blends in with the surrounding environment (as determined by specialist visual amenity assessment).	No	Not commenced	Visual amenity assessment report
Domain 5 – Stockpiled material					
Safe, stable, adequately drained post mining landforms consistent with the surrounding landscape.	Box cut filling	Material from visual bund (except the southern section) has been moved into the box cut to make a landform that is commensurate with the surrounding landform as determined by specialist visual amenity assessment.	No	Not commenced	Visual amenity assessment report
	Slumping or uncontrolled erosion	There is an absence of slumping or uncontrolled erosion with rills < 200 mm deep	Yes	Not commenced	Inspection reports
Domain 8 – Underground mining area					
Safe, stable, adequately drained post mining landforms consistent with the surrounding landscape.	Subsidence	Subsidence cracking has naturally closed/filled or been actively remediated in accordance with the requirements of the approved Extraction Plan.	No	Ongoing	Subsidence monitoring reports/Photographic evidence
		Subsidence across landscape does not exceed subsidence predictions	No	Ongoing	Subsidence monitoring reports
	Slope	Areas affected by mine induced subsidence have gradients that are consistent with the pre-mining and/or the surrounding topography and which are geotechnically stable (i.e., no increased risk of landslip or mass slope failure.)	No	Ongoing	Geotechnical report
	Erosion	Erosion mitigation measures have been applied. There is an absence of slumping or uncontrolled erosion with rills <200 mm deep.	Yes	Ongoing	Inspection reports
	Drainage	Natural drainage lines are stable (i.e., non-eroding) and, where contour banks and diversion drains have been installed, they are assessed as being long-term stable (> 3 years).	Yes	Ongoing	Inspection reports
	Ponding	Areas of surface ponding are assessed and remediated to enable natural drainage to occur (where there is a salinity risk).	Yes	Ongoing	Inspection reports

Table 6.3 - Growth media completion criteria

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
All rehabilitation areas					
Growth media resources are retained and managed to retain structure, chemical and biological properties.	Topsoil stripping depth	Maps show the location and volumes of Topsoils that are stockpiled for later re-use in accordance with management plans and procedures.	Yes	Ongoing	Mapping/Topsoil inventory
Topsoil will be replaced in disturbed areas to allow for rehabilitation	Topsoil spreading	Subsoil and topsoil have been replaced over areas of disturbance in the same order and approximately same depths as it was removed (at least 150mm topsoil), and it has been ripped.	Yes	Ongoing	Topsoil inventory/Inspection reports
	Topsoil quality	Testing verifies that there is a less than 20% increase in EC in comparison to baseline values.	Yes	Ongoing	Soil sample records
		Testing verifies that pH is within +/-0.5 of a pH unit of control sites at Year 5. If soil amelioration is undertaken, pH of pasture sites is to remain within recommended range of 5.2-8.0 pH units.			Soil sample records
		Testing verifies that there is less than a 20% reduction in organic matter in comparison to baseline values for Nitrogen, Phosphorus, and organic matter.			Soil sample records
Topsoils are characterised and ameliorated for use in final land uses.	Amelioration	Where through testing it has been determined to be necessary, appropriate soil ameliorants (e.g., gypsum, fertilisers, mulch) have been applied in accordance with recommendations from specialist assessment, with records kept	Yes	Ongoing	Soil sample records/Specialist assessment report
Erosion is minimised	Erosion	ESCs are installed prior to topsoil re-spreading.	Yes	Ongoing	As constructed reports
		Topsoiled rehabilitation areas are sown with a non-persistent cover crop at the sowing rate / ha as specified in Table 5.2.	Yes	Ongoing	Record of seed mix used
Domain D - Pasture					
Surface rock density appropriate for agricultural land use.	Surface rock density	Surface soils are rock raked to remove rocks and produce a friable surface.	No	Ongoing	Inspection reports
Domain E - Woodland and Domain F - State Forest					
Habitat features are salvaged and re-used in native vegetation rehabilitation to provide fauna habitat resources.	Habitat features	Habitat features are salvaged during clearing and, if assessed as being of use, incorporated into forested rehabilitation areas.	No	Ongoing	Pre - clearance and post-clearance reports
Domain J – Biodiversity offset area					
Habitat features are salvaged and re-used in woodland rehabilitation to provide fauna habitat resources	Habitat features	Habitat features are salvaged during pre-stripping operations for re-use where practicable.	No	Ongoing	Pre-clearance reports
	Log, hollows, and nest box density	Habitat features are incorporated into woodland rehabilitation areas where appropriate.	No	Ongoing	Biodiversity monitoring reports

Table 6.4 - Ecosystem and land use establishment completion criteria

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
All domains (in rehabilitated areas)					
Monitoring demonstrates soil profile development in rehabilitated areas (e.g., development of organic layer, litter layer)	pH	Testing verifies that pH is within +/-0.5 of a pH unit of control sites at Year 5. If soil amelioration is undertaken, pH of pasture sites is to remain within recommended range of 5.2-8.0 pH units.	Yes	Ongoing.	Soil assessment reports
	EC	Testing verifies that there is a less than 20% increase in soil EC in comparison to baseline values at Year 5 following establishment.	Yes	Ongoing.	Soil assessment reports
	Nutrients	Testing verifies that there is less than a 20% reduction in Nitrogen, phosphorus, and organic matter in comparison to baseline values at Year 5 following establishment.	Yes	Ongoing.	Soil assessment reports
Vegetation establishment	Ground cover	Percentage ground cover within 20% of control sites/baseline monitoring within five years of establishment.	No	Ongoing.	Biodiversity monitoring reports
		Identified areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change. Site specific management report prepared, and recommendations implemented where necessary.	No	Ongoing	Biodiversity monitoring reports
Weeds are controlled on NCOPL lands	Weed presence	Annual specialist biodiversity monitoring verifies there are no significant weed infestations and weeds do not comprise a significant proportion of the species in any stratum (less than 10% increase in exotic species number and cover)	Yes	Ongoing	Biodiversity monitoring reports
		Records indicate that noxious weeds are controlled in accordance with legislation, the Rehabilitation Management Plan, and the MOP.	Yes	Not Commenced	Biodiversity monitoring reports
Feral animal pests are controlled on NCOPL lands	Feral animal density	No increase in feral animal population and monitoring indicates the absence or decline in feral animal species numbers.	Yes	Ongoing.	Biodiversity monitoring reports
		Vertebrate pest species presence and densities are monitored, and control programs implemented in accordance with the Landscape Management Plan	Yes	Ongoing.	Biodiversity monitoring reports
	Fence / tree guard installation	Faunal exclusion fencing and/or tree guards are installed (where required) to exclude vertebrate pest species from rehabilitation areas / juvenile vegetation.	No	Ongoing.	Visual inspections
The area does not present an extreme bushfire hazard to surrounding areas	Fire management	Bushfire mitigation actions, including managing fuel loads, maintaining firebreaks and fire-fighting access, are implemented in accordance with the site Bushfire Prevention Standard.	No	Ongoing.	Annual Review
Water quality from rehabilitation area meets relevant water quality standards	Runoff water quality from rehabilitation areas	Water quality monitoring data provides evidence that runoff water quality from rehabilitation areas is within the range of baseline surface water from nearby creeks.	Yes	Ongoing.	Water sample reports
Riparian vegetation composition and health	Creek line erosion	Less than 20% increase in length of eroding creek line (bank and bed) when compared to control sites as determined by annual biodiversity assessment undertaken by specialist	No	Ongoing	Biodiversity monitoring reports
	Creek stability	Less than 20% increase in cross-sectional area in comparison to control cross-sectional area (unless stabilisation works have been undertaken) as determined by annual biodiversity assessment undertaken by specialist	No	Ongoing	Biodiversity monitoring reports
Domain D - Rehabilitation area - pasture					
Final landform will be capable of being used for agricultural purposes	Pasture species sowing rate.	Approved pasture species mix (refer Table 5.2) is sown at the specified sowing rate per hectare.	No	Ongoing.	Record of seed mix used and sowing rate
	Land and soil capability	1,630 ha of LSC Class 3 agricultural land is established on areas disturbed by mining.	No	Ongoing.	Agricultural land suitability assessment report
	Pasture Biomass	Less than 20% reduction in pasture biomass in impact zones in comparison to control zones.	No	Ongoing	Rehabilitation assessment report/Biodiversity monitoring reports/Soil assessment report

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
	Aquatic macroinvertebrate and macrophyte assemblages in farm dams	No decline in aquatic habitat quality relative to natural variation in control areas	No	Ongoing	Rehabilitation assessment report/Biodiversity monitoring reports
Domain E - Rehabilitation area – Woodland and Domain F – Rehabilitation area – State Forest					
Native vegetation rehabilitation areas species diversity is comparable to control sites native vegetation community	Habitat	No adverse impacts to habitat of threatened species, such as a reduction in habitat area, hollow-bearing trees and woody debris as determined by annual biodiversity monitoring by specialists	No	Ongoing.	Biodiversity monitoring reports
	Vegetation health	More than 75% of trees are healthy and growing as indicated by long term monitoring.	Yes	Ongoing.	Biodiversity monitoring reports
	Species composition	Less than 10% change in floristic composition (relative to natural variation found in control areas) as determined by specialist annual biodiversity monitoring	Yes	Ongoing.	Biodiversity monitoring reports
Stock have been excluded from rehabilitation areas	Stock exclusion	Stock have been excluded from these domains.	No	Ongoing.	Biodiversity monitoring reports
Domain J –Biodiversity offset area					
Native vegetation rehabilitation areas species diversity is comparable to control sites native vegetation community	Offsets	Approximately 1,168 ha of areas disturbed by mining, and 422 ha of land not disturbed by mining, will be rehabilitated with native vegetation communities.	No	Ongoing.	Biodiversity monitoring reports
	Habitat	No adverse impacts to habitat of threatened species, such as a reduction in habitat area, hollow-bearing trees and woody debris as determined by annual biodiversity monitoring by specialists	Yes	Ongoing.	Biodiversity monitoring reports
	Vegetation Cover	Within 3 years, 25% of seedlings (direct seeding) and 75% of direct landscape plantings have survived.	Yes	Ongoing.	Biodiversity monitoring reports
	Vegetation health	More than 75% of trees are healthy and growing as indicated by long term monitoring.	Yes	Ongoing.	Biodiversity monitoring reports
	Species composition	Less than 10% change in floristic composition (relative to natural variation found in control areas) as determined by specialist annual biodiversity monitoring	Yes	Ongoing.	Biodiversity monitoring reports
Fauna diversity is progressing towards the ecosystems planned in the final land use	Stock exclusion	Stock have been excluded from the BOA.	No	Ongoing.	Biodiversity monitoring reports

Table 6.5 - Ecosystem and land use sustainability completion criteria

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
All domains					
Soil stability and profile development is self-sustaining	Percent nitrogen, potassium and phosphorous.	Soil nitrogen, potassium and phosphorus levels are within two standard deviations of the mean value at control sites by Years 1, 5 and Year 15, respectively.	Yes	Ongoing	Soil assessment reports
	Weed management	Annual specialist biodiversity monitoring verifies there are no significant weed infestations and weeds do not comprise a significant proportion of the species in any stratum (less than 10% increase in exotic species number and cover)	Yes	Ongoing	Biodiversity monitoring reports
		Records indicate that noxious weeds are controlled in accordance with legislation, the Rehabilitation Management Plan, and the MOP.	Yes	Not Commenced	Biodiversity monitoring reports
	Ground cover.	Ground cover and / or leaf litter cover is greater than 70% at Year 5.	Yes	Ongoing	Biodiversity monitoring reports
	Runoff water quality	Receiving waters affected by surface water runoff have contaminant limits of electrical conductivity maximum of 1,300 µS/cm and pH range of 6 to 8.5, consistent with receiving waters.	Yes	Ongoing	Water sampling records/Water quality monitoring reports
	Site safety	The site has been rehabilitated and left in a clean, tidy and safe condition.	No	Not commenced	Risk Assessment/Visual assessment report
Domain D - Rehabilitation area - pasture					
Soil stability and profile development is self-sustaining	Soil quality	Salinity (EC), pH, and Cation Exchange Capacity (CEC) down the soil profile is within two standard deviations of mean values control sites at year 5.	Yes	Not commenced	Soil sample records/Soil assessment report
Agricultural Rehabilitation Areas maintain LSC Class 3 agricultural land suitability with only the typical land management actions	Agricultural land suitability assessment.	Agricultural Rehabilitation Areas are demonstrated to be capable of grazing and cropping in accordance with the general limitations that apply to LSC Class 3 agricultural land.	No	Not commenced	Agricultural land suitability assessment report
Domain E - Rehabilitation area – Woodland and Domain F – Rehabilitation area – State Forest					
Open woodland and riparian rehabilitation areas are on a trajectory to forming self-sustaining ecosystem function equivalent to appropriate control sites	Vegetation health index.	Percentage of healthy shrubs and trees (when ranked healthy, sick or dead.) is within the range of the mean percentage across control sites	Yes	Not commenced	Biodiversity monitoring reports
	Tree height and girth	Minimum tree height and girth standards for selected indicator species of the vegetation association is within the range of the mean within control site benchmarks at 1, 5 and 15 years.	No	Not commenced	Biodiversity monitoring reports
	Flowering specimen density / second generation presence	Species are capable of setting viable seed, flowering or otherwise reproducing. Second generation of at least four vegetation community species recorded.	No	Not commenced	Biodiversity monitoring reports
	Species composition	Forested rehabilitation areas contain an appropriate diversity of flora species for each stratum (canopy, mid-story, ground cover) comparable to control sites at Year 10.	No	Not commenced	Biodiversity monitoring reports
	Reproduction	Second generation tree seedlings are present or likely to be, based on monitoring in comparable older rehabilitation sites.	No	Not commenced	Biodiversity monitoring reports
	Habitat	Native vegetation rehabilitation areas provide a range of structural habitats (e.g., eucalypts, shrubs, ground cover, developing litter layer etc.).	No	Not commenced	Biodiversity monitoring reports
	Native fauna presence	Native fauna species diversity and abundance is trending toward control site at Year 10.	Yes	Not commenced	Biodiversity monitoring reports
Soil stability and profile development is self-sustaining	Litter biomass (depth, total mass)	Depth and mass of litter varies by less than 10% in consecutive surveys by Year 15.	No	Not commenced	Biodiversity monitoring reports
Domain J –Biodiversity offset area					
Restrict unauthorised access	Public Access	The incidence of unauthorised personnel entering the BOA is reduced due to the construction of barriers and erection of signage.	No	Not commenced	Inspection reports/Biodiversity offset area monitoring reports

Domain objective	Performance indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
Open woodland and riparian rehabilitation areas are on a trajectory to forming self-sustaining ecosystem function equivalent to appropriate control sites	Vegetation health index.	Percentage of healthy shrubs and trees (when ranked healthy, sick or dead.) is within the range of the mean percentage across control sites.	Yes	Not commenced	Biodiversity offset area monitoring reports
	Tree height and girth	Minimum tree height and girth standards for selected indicator species of the vegetation association is within the range of the mean within control site benchmarks at 1, 5 and 15 years.	No	Not commenced	Biodiversity offset area monitoring reports
	Flowering specimen density / second generation presence	Species are capable of setting viable seed, flowering or otherwise reproducing. Second generation of at least four vegetation community species recorded.	No	Not commenced	Biodiversity offset area monitoring reports
	Threatened species	Regular monitoring reveals that management measures have been successful in protecting Red Ironbark-Brown Bloodwood Shrubby Woodland which provides habitat for EPBC listed *Bertya opponens* and for the White Box Grassy Woodland which provides habitat for the EPBC listed Superb Parrot.	Yes	Not commenced	Biodiversity offset area monitoring reports
		Monitoring reveals that management measures have been successful in protecting the Inland Grey Box EEC, *Bertya opponens*, and foraging habitat for the Superb Parrot.	Yes	Not commenced	Biodiversity offset area monitoring reports
	Fauna diversity	Monitoring data provides evidence of a range of structural habitats similar to baseline survey results within BOA.	No	Not commenced	Biodiversity offset area monitoring reports
	Percent canopy cover	Native plant species richness, and native canopy, mid-storey and grass cover has been restored to within 75% of benchmark condition within specified timeframes (canopy 15 years, mid-storey 10 years, groundcover 5 years).	No	Not commenced	Biodiversity offset area monitoring reports
	Weed Management	Exotic ground cover has been reduced to <10% by Year 10 and maintained at less than 5% thereafter. Woody weeds have been maintained at less than 1% after year 5.	Yes	Not commenced	Biodiversity offset area monitoring reports
	Feral animal density	If monitoring of the BOA reveals feral animals are having a significant impact on conservation objectives, then appropriate feral control measures will be implemented in co-ordination with those of adjacent land managers such as State Forests and private landowners.	Yes	Not commenced	Biodiversity offset area monitoring reports
The area does not present an extreme bushfire hazard to surrounding areas	Fire Management	Bushfire risk is managed in accordance with a Bushfire Management Plan prepared in consultation with the RFS as required.	No	Not commenced	Annual Review
No adverse impacts of runoff or hydrological changes on the BOA	Water quality	Regular monitoring reveals that water management measures have been successful in protecting natural systems from adverse impacts.	No	Not commenced	Water sample records/Water quality assessment report
Soil stability and profile development is self-sustaining	Litter biomass (depth, total mass)	Depth and mass of litter varies by less than 10% in consecutive surveys by Year 15.	No	Not commenced	Biodiversity offset area monitoring reports

Table 6.6 - Land relinquishment completion criteria

Domain objective	Performance Indicator	Completion criteria	Link to TARP	Progress/timing	Verification method
All 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 (Rehabilitation Phases) are acknowledged to be met by the Resources Regulator (or contemporary equivalent).	No	Not commenced	Rehabilitation assessment report
	Access Tracks	Access tracks not required in the final landform are decommissioned and rehabilitated.	No	Not commenced	Rehabilitation assessment report
	Monitoring Points	Any ancillary disturbance or equipment associated with surface water and rehabilitation monitoring points is removed and/or rehabilitated.	No	Not commenced	Rehabilitation assessment report
	Visual Assessment	Sign off from Resources Regulator that the landforms developed are compatible with the surrounding landscape and they approve such landform as part of the MOP approval.	No	Not commenced	Record of correspondence with RR
	Runoff water quality from rehabilitation areas	Water quality monitoring data provides evidence that runoff water quality from rehabilitation areas is within the range of baseline surface water.	Yes	Not commenced	Water sample records/Water quality monitoring report
	Public Safety	Long-term subsidence monitoring inspections identify that are no public safety risks attributable to NCOPL which require the implementation of remedial actions.	No	Not commenced	Risk Assessment
	Rubbish	There is no rubbish equipment at the location of any completed subsidence remediation works.	No	Not commenced	Rehabilitation assessment report
	Vegetation	Vegetation is naturally regenerating, or active revegetation is establishing and no further active revegetation measures are required.	Yes	Not commenced	Rehabilitation assessment report
Domain J –Biodiversity offset area					
Post mining conservation of offsets	Conservation Covenant	A legally binding conservation covenant has been placed on the title of the on-site 422 ha BOA following the cessation of mining.	No	Not commenced	Record of conservation covenant

7. Monitoring program

Performance of the rehabilitation works will be monitored over time to assess achievement of the short- and long-term objectives detailed in section 2, and the rehabilitation objectives for each domain (section 4.4).

Data on rehabilitation activities and status is currently collected every 12 months (at a minimum) and documented in the Rehabilitation Tracker, supported by photographs (section 7.1). This monitoring provides an assessment of each disturbance area against the rehabilitation phases and completion criteria. This data will also be used to further assist in refining rehabilitation methods across the site.

The rehabilitation monitoring program reflects the progressive rehabilitation that has been undertaken within the ML to date, with future rehabilitation monitoring to be outlined in subsequent RMPs in accordance with the tables in section 6. If rehabilitation monitoring indicates that rehabilitation and revegetation is not progressing towards the completion criteria, implementation of the TARP may be required (refer to section 3 of the LSMP). It should be noted that the subsidence monitoring program is detailed in the LMP.

7.1 Photo monitoring method

For photo monitoring that is required in rehabilitated areas of remnant vegetation and fauna habitat, the following photo monitoring method will be implemented. A standard photo monitoring point will include:

- two six-foot star droppers 10 m apart, the second star picket will be in a south-east direction from the first star picket;
- tag the star droppers with flagging tape and replace flagging tape on an annual basis;
- the location of the first star picket will be recorded with a GPS;
- use a range pole as a reference point against the second star dropper, with details of the photo monitoring point marked;
- take a digital photo of each photo monitoring point from the first star picket in a south-east direction to the second star dropper, with the whole length of the range pole in view; and
- organise the digital photos logically with each image labelled with a unique reference number indicating the location of the photo monitoring point and the date the photo is taken (i.e., “01_2009_09_08” for photo point 1 taken on 8 September 2021).

Photo monitoring points will be produced and monitored on an annual basis until mine closure is complete.

7.2 Landform stability method

Point intercept transects will be established to monitor landform stability within each relevant domain utilising the following method:

- each transect will be a minimum of 50 m apart and will be 100 m in length in an east-west direction, roughly perpendicular to the contour bank;
- the beginning and end of each transect will be permanently marked with a star dropper; and
- along each transect at every 1 m interval the following information will be recorded:
  - pasture species touching the point;
  - presence/absence of bare ground; and
  - erosion or sedimentation.

Transects will not be established in other areas until mine closure is initiated. The final landform will be considered stable when for five consecutive years >85% of pasture grasses are established, there is <15% bare ground and there are no visible signs of erosion for each domain.

7.3 Weed and pest animals

7.3.1 Weeds

Weed management at Narrabri Mine consists of spot spraying programs (two-week programs) periodically throughout the year. Locations are based on annual ecological monitoring reports and locations of listed weed species. The monitoring will inform the level of control required and the control of weeds will assist with the protection and management of remnant vegetation and habitat and minimise the impacts on native fauna.

Weeds are to be controlled in accordance with the *Biosecurity Act 2015* (NSW) and the North West Regional Strategic Weed Management Plan 2017-2022 (North West Local Land Services, 2017). Council will be consulted on an ongoing basis in the development and delivery of weed management programs. At the time of mine closure, weeds detailed in Table 5.1 that are present within ML 1609 will continue to be subject to weed management.

Monitoring is to record weed species, density, and location via GPS and the development of weed distribution maps as part of the annual reporting. Following weed control, contractors are required to provide records of weed species, control method (including herbicide usage i.e., type and volume), density and locations.

Weed control in the pastoral areas is planned to be managed by landholder management and pasture improvement (or as recommended in subsequent management plans).

7.3.2 Pest animals

The feral pest monitoring and control program will largely employ the Sand Plot Technique for use with cameras. Other techniques that may be implemented include:

- spotlight counts;
- tracks and scats/dung;
- bait uptake;
- warren counts/active entrance counts;
- population sampling (using traps);
- observations (sightings, howling etc.); and
- camera trapping.

Monitoring will record the feral pest species, number, and location.

Control techniques will include baiting, pig trapping, shooting for known pest species including feral pigs, foxes, wild dogs, and cats. Contractors are to record control methods used, targeted species, numbers and location. Pest animals that may be hunted in NSW are listed in Schedule 3 of the *Game and Feral Animal Control Act 2002* (NSW).

7.4 Use of control sites

Monitoring at control sites will be undertaken to provide baseline data for comparison with rehabilitation sites. Baseline data will be used to quantify indicators and completion criteria and will be documented in future RMPs. Woodland control sites have been established under the BMP and are known as flora monitoring sites and fauna monitoring sites.

Woodland control sites have been selected from control zones (zones of no impact located outside of any predicted subsidence zone) with similar characteristics and biological condition that lie beyond the predicted impact zone. Surveys in the woodland/forest control sites will be undertaken to build baseline data for soil profiles, vegetation features and presence of fauna and habitat features.

Monitoring at the pasture/agricultural control sites will be used to develop baseline data for pasture species densities and diversity, total biomass per hectare and agricultural soil physical-chemical data at representative productive pastoral control sites.

Remote sensing (LiDAR, multi-spectral imaging and EM 38[5]) is also utilised to monitor the rehabilitation areas against control areas and the data is used to quantify comparison of key land surface condition parameters in agricultural and creek line environments. Repeat capture and analysis of the multi-spectral imagery will also highlight areas of changes in vegetation cover beyond those found in control areas. Targeted field work will be implemented to examine the causes of any change highlighted. A program of field surveys based on a stratified random and targeted design is also implemented for agricultural and creek line areas in accordance with the LMP.

[5] EM 38 is proprietary electromagnetic monitoring device for rapid soil water moisture monitoring.

Table 7.1 - Rehabilitation monitoring program

Domain	Performance indicator	Purpose	Method	Frequency
Phase 1 – Active/operational and decommissioning				
All	Infrastructure	To ensure all surface infrastructure has been demolished and removed from the site.	Visual inspection	Following undermining of each Panel
		To confirm that access tracks have been ripped, topsoiled, and revegetated as soon as possible after they are no longer required for mining operations.	Visual inspection	Following undermining of each Panel
		To ensure that all boreholes have been backfilled and capped in accordance with Condition 17 of ML1609, the *Exploration Code of Practice: Rehabilitation* (DPE, 2015), and the *Guideline for Mineral Exploration Drilling; Drilling and Integrity of Petroleum Exploration and Production Wells* (DRE, 2016).	Visual inspection	Following undermining of each Panel
		To ensure all subsidence pegs have been removed in consultation with Resources Regulator.	Visual inspection	Following undermining of each Panel
Phase 2 - Landform establishment				
All	Final landform stability (LFA)	To determine if all earthworks, drainage lines and disturbed areas no longer required for mine-related activities have been stabilised, erosion and sedimentation is minimised and visibility of the activities from adjacent properties and the local road network is reduced.	Visual inspection of erosion/sedimentation and groundcover or other stabilisation methods via Landscape Function Analysis (**LFA**) (or other systemised monitoring method). Point intercept method as described in section 7.2.	Annually for 3 consecutive years
	Final landform soil moisture and nutrient distribution.	To identify areas of electromagnetic mapping change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change.	Remote sensing – electromagnetic mapping technique	Annually
1 – Infrastructure Area	Pit top	To ensure the post mining landform has been shaped to create a stable surface with slopes at a maximum of 4 degrees.	Landform stability method as described in section 7.2.	Annually for 3 consecutive years
8 – Underground Mining Area	Topsoil stripping depth	To map the location and volumes of topsoil that are stockpiled for later re-use in accordance with management plans and procedures.	Mapping	Progressively as each area is established
	Topsoil spreading	To ensure subsoil and topsoil have been replaced over areas of disturbance in the same order and approximately same depths as it was removed (at least 150 mm topsoil), and it has been ripped.	Visual inspection	Ongoing
	Topsoil quality	To determine amelioration requirements for rehabilitation.	Soil sampling in accordance with the xxx (plan)	Prior to use in rehabilitation
		To verify there is a less than 20% increase in EC in comparison to baseline values.	Soil sampling	Annually
		To verify that pH is within +/-0.5 of a pH unit of control sites at Year 5. If soil amelioration is undertaken, pH of pasture sites is to remain within recommended range of 5.2-8.0 pH units.	Soil sampling	Annually
		To verify that there is less than a 20% reduction in organic matter in comparison to baseline values for Nitrogen, Phosphorus, and organic matter.	Soil sampling	Annually
	Erosion	To determine if ESCs are installed appropriately	Visual inspection and verification against the ERSED control plan	Prior to topsoil re-spreading.
		To ensure topsoiled rehabilitation areas are sown with a non-persistent cover crop.	Verification of appropriate seed mix Visual inspection Photographs	Annually

Domain	Performance indicator	Purpose	Method	Frequency
D - Pasture	Surface rock density	To confirm that surface soils are rock raked to remove rocks and produce a friable surface.	Visual inspection	Ongoing
E - Woodland and Domain & F - State Forest	Habitat features	To determine if habitat features have been salvaged during clearing and incorporated into forested and woodland rehabilitation areas where appropriate.	Visual inspection Photo monitoring points	Following clearance activities
J – Biodiversity Offset Area	Log, hollows, and nest box density	To assess if habitat features have been incorporated into woodland rehabilitation areas where appropriate.	Biodiversity assessment in accordance with the Biodiversity Offset Management Plan (**BOMP**)	Annually
Phase 4 -Ecosystem and land use establishment				
All - in rehabilitated areas	pH	To ensure testing verifies that pH is within +/-0.5 of a pH unit of control sites at Year 5. If soil amelioration is undertaken, pH of pasture sites is to remain within recommended range of 5.2-8.0 pH units.	Soil sampling	Year 5
	EC	To ensure that testing verifies there is a less than 20% increase in soil EC in comparison to baseline values at Year 5 following establishment.	Soil sampling	Year 5
	Nutrients	To ensure that testing verifies there is less than a 20% reduction in Nitrogen, phosphorus, and organic matter in comparison to baseline values at Year 5 following establishment.	Soil sampling	Year 5
	Ground cover	To assess the percentage of ground cover to be within 20% of control sites/baseline monitoring within five years of establishment.	Visual inspection Photographs Quadrats with % cover	Annually
		To identify areas of NDVI change (greater than 1 standard deviation from the mean change) investigated in the field to determine the source of the change. Site specific management report prepared, and recommendations implemented where necessary.	Remote sensing Mapping	Annually
	Weed presence	To verify there are no significant weed infestations in rehabilitated areas and weeds do not comprise a significant proportion of the species in any stratum (less than 10% increase in exotic species number and cover)	Monitoring in accordance with section 7.3.1	Annually
		To determine if weed control techniques are adequate.	Visual inspection Record weed species, density, and location via GPS	Annually
	Feral pest density	To verify the absence or decline in feral pest species numbers and to determine if feral pest control techniques are adequate.	Monitoring in accordance with section 7.3.2	Annually
	Fence / tree guard installation	To assess the faunal exclusion fencing and/or tree guards are installed and undamaged in rehabilitation areas / juvenile vegetation.	Visual inspection	Annually
	Fire management	To inspect fuel loads, firebreaks and fire-fighting access routes are maintained in accordance with the site Bushfire Prevention Standard.	Visual inspection Also refer to the Bushfire Management Strategy provided in Attachment 6	6 monthly
	Runoff water quality from rehabilitation areas	To assess runoff water quality from rehabilitation areas is within the range of baseline surface water from nearby creeks.	Water sampling in accordance with Water Management Plan (**WMP**).	Specialist consultant
	Creek line erosion	To ensure there is <20% increase in length of eroding creek line (bank and bed) when compared to control sites.	Assessment in accordance with LMP.	Annually
	Creek stability	To ensure there is <20% increase in cross-sectional area in comparison to control cross-sectional area (unless stabilisation works have been undertaken).	Assessment in accordance with LMP.	Annually

Domain	Performance indicator	Purpose	Method	Frequency
D - Rehabilitation Area - Pasture	Land and soil capability	To verify there is 1,630 ha of LSC Class 3 agricultural land is established on areas disturbed by mining.	Remote sensing Mapping	Annually
	Pasture biomass	To ensure a <20% reduction in pasture biomass in impact zones in comparison to control zones.	Remote sensing	Annually
	Aquatic macroinvertebrate and macrophyte assemblages in farm dams	To assess no decline in aquatic habitat quality relative to natural variation in control areas for farm dams.	Biodiversity assessment in accordance with the BMP	Annually
E - Rehabilitation Area – Woodland & Domain F – Rehabilitation E - Rehabilitation Area F – State Forest	Habitat	To assess no adverse impacts to habitat of threatened species, such as a reduction in habitat area, hollow-bearing trees and woody debris.	Visual assessment Mapping Photo monitoring	Annually
	Vegetation health	To ensure that >75% of trees are healthy and growing as indicated by long term monitoring.	Visual assessment Mapping Photo monitoring	Annually
	Species composition	To ensure that <10% change in floristic composition (relative to natural variation found in control areas) as determined by specialist annual biodiversity monitoring	Visual assessment Mapping Photo monitoring	Annually
	Stock exclusion	To verify stock have been excluded from these domains.	Visual assessment Mapping Photo monitoring	Annually
J –Biodiversity Offset Area	Offsets	To assess that approximately 1,168 ha of areas disturbed by mining, and 422 ha of land not disturbed by mining are rehabilitated with native vegetation communities.	Biodiversity assessment in accordance with the BOMP.	Annually
		To verify no adverse impacts to habitat of threatened species, such as a reduction in habitat area, hollow-bearing trees and woody debris as determined by annual biodiversity monitoring by specialists		Annually
		To assess 25% of seedlings (direct seeding) and 75% of direct landscape plantings have survived within 3 years.		Annually
		To assess <10% change in floristic composition (relative to natural variation found in control areas) as determined by specialist annual biodiversity monitoring		Annually
		To verify stock have been excluded from the BOA.		Annually
Phase 5- Ecosystem and land use sustainability				
All	Percent nitrogen, potassium and phosphorous.	To assess soil nitrogen, potassium and phosphorus levels are within two standard deviations of the mean value at control sites by Years 1, 5 and Year 15, respectively.	Soil sampling	As required
	Weed management	To assess there are no significant weed infestations and weeds do not comprise a significant proportion of the species in any stratum (less than 20% increase in exotic species number and cover) and that records indicate that noxious weeds are controlled.	Weed control in accordance with section 7.3.1	Annually

Domain	Performance indicator	Purpose	Method	Frequency
	Ground cover	To assess ground cover and / or leaf litter cover is >70% at Year 5.	Visual inspection Photo monitoring Mapping Quadrats with % groundcover/leaf litter	Annually
	Runoff water quality	To verify receiving waters affected by surface water runoff have contaminant limits of EC maximum of 1,300 µS/cm and pH range of 6 to 8.5, consistent with receiving waters.	Water sampling in accordance with the WMP	As per WMP

7.5 Research and rehabilitation trials

Continuous improvement

NCOPL adopts a continuous improvement approach to rehabilitation. Results from rehabilitation monitoring and opportunistic observations are used to refine rehabilitation methodologies on an on-going basis.

Future research

Should suitable research/trial opportunities be identified, they will be investigated and implemented. Rehabilitation monitoring and methodology records are shared among Whitehaven operations to inform decision making regarding future rehabilitation campaigns.

8. Rehabilitation completion

Once the rehabilitation monitoring indicates that the completion criteria have been achieved, the NCOPL Environment Superintendent will undertake the following steps:

- engage a suitably qualified and experienced consultant to complete a final rehabilitation assessment and record findings to ensure all objectives have been met;
- complete an *ESF2: Rehabilitation completion and notification of mine site closure* in accordance with the *Guidelines: Rehabilitation cost estimate* (NSW Resources Regulator, 2021) that must document rehabilitation implementation and outcomes and demonstrate that the requirements have been met;
- arrange for DPE to undertake an assessment which may include an inspection of the mine site by the Resources Regulator, and address any outstanding issues that may have been identified.

The *Guidelines: Rehabilitation cost estimate* (Resources Regulator, 2021) indicate that the securities will be released or revised downwards when either the Minister or the Secretary is satisfied that NCOPL has demonstrated that rehabilitation obligations have been met. The Resource Regulator encourages progressive rehabilitation and titleholders may request a security review to reflect a decrease in rehabilitation liabilities

Further details of rehabilitation completion, cancellation of the mining lease and the return of the security bond are provided in section 6 of the MCP.

9. Plan implementation

9.1 Roles and responsibilities

To ensure adequate implementation of this RMP, the following responsibilities have been assigned to relevant NCOPL personnel as detailed in Table 9.1. It is also noted that additional responsibilities are referred to within the Extraction Plan and the appended sub-plans.

Table 9.1 - Roles and responsibilities

Roles	Responsibilities
General Manager	• Ensure that adequate resources are available to NCOPL personnel to facilitate the completion of their responsibilities under this RMP. • Communication with statutory authorities and the community.
Mine Manager	• Ensure all contractors, sub-contractors and service-personnel are appropriately qualified, competent and licensed to undertake the required work and have a good environmental performance record. • Ensure the LSMP is implemented and adhered to.
Environmental Superintendent	• Ensure that all rehabilitation monitoring and reporting is undertaken in accordance with this RMP and various approval requirements, and is checked, processed, and filed appropriately. • Advise on matters identified in all approval, permit, licence and consent documents and ensure all operations are conducted in compliance with those conditions, and all other environmental obligations. • Ensure all rehabilitation is completed as per the approved documents and in a timely manner. • Liaise with stakeholders regarding subsidence impact management. • Authorise changes to this RMP

Though retaining the responsibilities identified above, these personnel may, at their discretion, delegate specific tasks to suitably qualified and experienced operational personnel or consultants.

10. Reporting, evaluation and review

10.1 Annual Review

In accordance with Schedule 6 Condition 6, NCOPL will review the performance of its rehabilitation management for the previous calendar year and report the relevant results within the Annual Review, to the satisfaction of the Secretary. Rehabilitation reporting includes information on the rehabilitation status, post rehabilitation land uses, rehabilitation performance indicators, decommissioning and demolition activities, sign-offs by DPE, variations in the RMP, monitoring, trials and research, and key issues for achieving rehabilitation success. The reporting also includes information on the management and monitoring of bushfire aspects as part of the RMP.

Further, the Annual Review requires a number of items to be reviewed or assessed. In summary these are:

- monitoring results and complaints;
- non-compliances and incidents;
- compliance with performance measures;
- discrepancies between predicted and actual impacts; and
- measures to be implemented to improve environmental performance.

The Annual Review listed above will ensure compliance with SoC 8.17 which states that NCOPL is to undertake annual reviews of the revegetation program to ensure it remains relevant. The Annual Review may also make recommendations for any additions, changes or improvements to the rehabilitation management process.

The Annual Review will be made available on the WHC website.

10.2 Independent environmental audits

Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, NCOPL will commission and pay the full cost of an Independent Environmental Audit (**IEA**) of the operations at Narrabri Mine (Stages 1 and 2), to be conducted in accordance with the requirements under Schedule 6 Condition 7.

The audit team will be led by a suitably qualified auditor and the IEA will be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary.

10.3 Management plan review and evaluation

As required by Schedule 6 Condition 3 of the Project Approval, within three months of any of the following:

- completion of an independent environmental audit (as required by Schedule 6 Condition 7);
- submission of an Incident Report (as required by Schedule 6 Condition 4);
- submission of an Annual Review (as required by Schedule 6 Condition 6); and
- any modification to the conditions of the Project Approval (unless the conditions require otherwise),

NCOPL will the review, and if necessary, revise this RMP. This is to ensure that the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the

environmental performance of the Narrabri Mine operations. The review history table in the front of this Plan provides the details of each review.

Condition 3 of Schedule 6 further states that if the review determines that this RMP requires revision, then this will be completed to the satisfaction of the Secretary.

11. Incidents and non-compliance

11.1 Incident notification

An incident is defined under the Project Approval as *a set of circumstances that causes or threatens to cause material harm, and/or breaches or exceeds the limits of performance measures/criteria*. Material harm to the environment is defined under the Project Approval as *involving actual or potential harm to the health or safety of human beings or to the environment that is not trivial.* This definition excludes "harm" that is authorised under either the Project Approval or any other statutory approval (e.g., the EPL).

In the event of any exceedance of or deviation from performance criteria, NCOPL will advise the Secretary and any other relevant agencies as soon as practicable after becoming aware of the incident, in accordance with Schedule 6 Condition 4. Within 7 days of the event, NCOPL will also provide the Secretary and any relevant agencies a detailed report which will:

- describe the date, time and nature of the exceedance/incident;
- identify the cause (or likely cause) of the exceedance/incident;
- describe what action has been taken to date; and
- describe the proposed measures to address the exceedance/incident.

Notifications to the EPA will be made by contacting the Environment Line service on 131 555 and written details of the notification will be provided within 7 days of the date on which the incident occurred.

Incident reporting and emergency response is further described in NCO's Environmental Management System.

11.2 Non-compliance notification

In accordance with Schedule 6 Condition 2, where a non-compliance with statutory requirements or an exceedance of the relevant criteria or performance measures has occurred, NCOPL will, at the earliest opportunity, take all reasonable and feasible steps to ensure that the exceedance ceases and does not recur. Once this has been achieved, all reasonable and feasible options for remediation (where relevant) will be considered.

In accordance with Schedule 6 Condition 4, within seven days of becoming aware of a non-compliance, NCOPL will notify DPE of the non-compliance[6]. The notification will be made in writing via the Major Projects website and identify the development (including the development application number and name), set out the condition or requirement that the development is non-compliant with, why it does not comply and the reasons for the non-compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.

NCOPL will implement any reasonable remediation measures as directed by the Secretary, to the satisfaction of the Secretary.

[6] A non-compliance which has been notified as an incident under section 11.1 does not need to also be notified as a non-compliance.

12. Complaints management

Any complaints received in relation to this RMP will be managed in accordance with the complaints management protocol, as follows:

- publicly advertised telephone complaints line, 1800WHAVEN, will be in place to receive complaints;
- each complaint received will be recorded in the Complaints Register, which will include the following details:
  - date and time of complaint;
  - method by which a complaint was made;
  - personal details the complainant wishes to provide or, if no such details are provided, a note to that effect;
  - nature of the incident that led to the complaint;
  - action taken by NCOPL in relation to the complaint (i.e., any required remedial actions), including any follow-up contact with the complainant; and
  - if no action was taken, the reason why no action was taken;
- the Environmental Superintendent will be responsible for ensuring that an initial response is provided within 24 hours of receipt of a complaint (except in the event of complaints recorded when the mine is not operational or outside of usual business hours);
- once the identified measures are undertaken, the Environmental Superintendent will sign off on the relevant complaint within the Complaints Register;
- if necessary, follow-up monitoring will take place to confirm the source of the complaint is adequately mitigated; and
- a summary of the complaints will be maintained by NCOPL and made available to the Community Consultative Committee, the complainant (on request) and on the WHC website. A summary of complaints received every 12 months will be provided in the Annual Review.

The Environmental Superintendent retains ultimate responsibility to ensure that complaints received are properly recorded and addressed appropriately.

In the event that any complainant considers that NCOPL has not adequately addressed their concerns, the NCOPL representative will convene additional meetings with the complainant. If the complainant believes the matter remains unresolved, and no further agreement can be reached as to additional measures to be undertaken, then they may refer the matter to DPE.

13. References

ATC Williams (2020). *Narrabri Mine Reject Emplacement Area - Capping Assessment and Closure Design*. Prepared for Narrabri Coal Operations Pty Ltd.

Department of Planning and Environment (unpublished). *Guidelines for the Preparation of Extraction Plans*.

Department of Planning and Environment (2015). *Exploration Code of Practice: Rehabilitation*

Department of Resources and Energy (2016). *Guideline for Mineral Exploration Drilling; Drilling and Integrity of Petroleum Exploration and Production Wells*.

Ditton Geotechnical Services (2017) *Mine Subsidence Assessment for the Proposed LW107 to LW110 Extraction Plan at the Narrabri Mine*. Prepared for Narrabri Coal Operations Pty Ltd

Ditton Geotechnical Services (2021) *Mine Subsidence Assessment for Pillar Reduction Panels CF201-CF205 (A-J) and Longwalls LW203 to LW205 at the Narrabri Underground Mine*. Prepared for Narrabri Coal Operations Pty Ltd. DGS Report No. NAR-004/8. Prepared for Narrabri Coal Operations Pty Ltd.

Eco Logical Australia (2019). *Narrabri Mine Landscape Management Plan (LW101 to LW110)*. Prepared for Narrabri Coal Operations Pty Ltd.

Eco Logical Australia (2019). *Narrabri Mine Rehabilitation Management Plan (LW101 to LW110)*. Prepared for Narrabri Coal Operations Pty Ltd.

Landcom (2004) *Managing Urban Stormwater - Soils and Construction: Volume 1*.

NSW Resources Regulator (2021). *Guidelines: Rehabilitation cost estimate*.

NSW Resources Regulator (2021). *Guideline: Rehabilitation Risk Assessment*.

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

Resource Strategies (2015) *Narrabri Mine Modification 5 - Environmental Assessment*. Prepared for Narrabri Coal Operations Pty Ltd

Resource Strategies (2021) *Narrabri Mine Modification 7 - Environmental Assessment.* Prepared for Narrabri Coal Operations Pty Ltd

RW Corkery & Co. Pty Ltd (2009) *Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project*, Project Application No:MP08_0144. Prepared for Narrabri Coal Operations Pty Ltd

SLR (2019). *Narrabri Coal Mine - Revised Conceptual Mine Closure Plan for Stage 2 Longwall Operations*. Prepared for Narrabri Coal Operations Pty Ltd.

14. Glossary

Term	Definition[7]
Environmental consequences	The environmental consequences of subsidence impacts including: damage to built features; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls; damage to Aboriginal heritage sites; impacts to aquatic ecology; ponding.
Extraction Plan Area	The area predicted to be affected by the proposed secondary extraction of the approved pillar reduction panels CF 201-205.
Goaf	The mined-out area into which the immediate roof strata breaks.
Groundwater	Water contained in the interconnected pore spaces and voids of the saturated zone of sediments and rocks.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Material harm	Material harm to the environment is defined in section 147 of the POEO Act
Minimise	Implement all reasonable and feasible mitigation measures to reduce the impacts of the Narrabri Mine
MOD 5	Reduced the number of longwall panels from 26 to 20; increased the longwall panel widths for LW 107 to LW 120 from approximately 295 m to approximately 400 m; extended the western footprint approximately 60 m; and increased the maximum ROM coal processing rate from 8 Mtpa to 11 Mtpa.
MOD 7	Describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205
Panels 201 to 202	Pillar reduction panels CF 201 to CF 205
Project Approval	Development consent (DA_08_0144) issued on 26th July 2010 under Section 75J of the Environmental Planning and Assessment Act 1979 by the Department of Planning & Infrastructure (as modified).
Rehabilitation	The restoration of land disturbed by the development to ensure it is safe, stable and non-polluting over the short, medium and long term
Second workings	Extraction of coal from longwall panels, mini-wall panels, or pillar extraction.
Secretary	Planning Secretary under the EP&A Act, or nominee
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts.
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, including both vertical and horizontal displacement, tilt, strain and curvature.
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs.
Surface water	A river, creek or other stream, including a stream in the form of an anabranch or tributary, in which water flows permanently or intermittently, regardless of the

[7] The majority of the definitions are as provided in Project Approval 08_0144.

Term	Definition[7]
	frequency of flow events: In a natural channel, whether artificially modified or not, or in an artificial channel that has changed the course of the stream. It also includes weirs, lakes and dams
Tensile strain	An increase in the distance between two points on the surface. This is likely to cause cracking at the surface if it exceeds 2 mm/m. Tensile strains are usually associated with convex (hogging) curvatures near the sides (or ends) of the panels.
Tilt	The rate of change of subsidence between two points (A and B), measured at set distances apart (usually 10m). Tilt is plotted at the mid-point between the points and is a measure of the amount of differential subsidence
Upsidence	Relative vertical upward movements of the ground surface associated with subsidence.
Vertical subsidence	Vertical downward movements of the ground surface caused by underground coal mining.

Attachment 1 Compliance conditions relevant to the RMP

Table A1.1 - Relevant Project Approval 08_0144 requirements

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
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.	Section 1.3
Schedule 2 Condition 11	With the approval of the Secretary, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis. ***Note**: The conditions of this approval require certain strategies, plans, and programs to be prepared for the project. They also require these documents to be reviewed and audited on a regular basis to ensure they remain effective. However, in some instances, it will not be necessary or practicable to prepare these documents for the whole project at any one time, particularly as these documents are intended to be dynamic and improved over time. Consequently, the documents may be prepared and implemented on a progressive basis, subject to the conditions of this approval. In doing this however, the Proponent will need to demonstrate that it has suitable documents in place to manage the existing operations of the project.*	There is no staging for the RMP for Panels 201-202
Schedule 5 Condition 1	The Proponent shall rehabilitate the site to the satisfaction of the Secretary and Resources Regulator in accordance with the rehabilitation objectives in Table 1.	Section 2.2
	Table 1: Rehabilitation objectives	
	Domain / **Rehabilitation objectives** Surface Facilities Area — Set through Schedule 5 Condition 4 below Other land affected by the project — Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: • comprised of local native plant species; with • a landform consistent with the surrounding environment Built features — Repair/restore to pre-mining condition or equivalent Community — Minimise the adverse socio-economic effects associated with mine closure including the reduction in local and regional employment Ensure public safety	
	***Note**: The Proponent may be required to define other rehabilitation objectives in management plans or strategy required under this schedule.*	
Schedule 5 Condition 1	To the extent that mining operations permit, the Proponent shall carry out rehabilitation progressively, that is, as soon as reasonably practicable following the disturbance.	Section 4.4
Schedule 5, Condition 4	The Rehabilitation Management Plan must include:	
	(a) the rehabilitation objectives for the site;	Section 2

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
	(b) a strategic description of how the rehabilitation of the site would be integrated with surrounding land use;	Section 5
	(c) a general description of the short- and long-term measures that would be implemented to rehabilitate the site;	Section 2
	(d) a detailed description of the measures that would be implemented to remediate predicted subsidence impacts under individual Extraction Plans;	Section 3.2.7
	(e) a detailed description of the measures that would be implemented to minimise environmental impacts of mining operations and to rehabilitate the site, including measures to be implemented for:	Section 5.1
	• managing remnant vegetation and habitat on site;	Section 5.1.3
	• minimising impacts on fauna;	Section 5.1.4
	• minimising visual impacts;	Section 5.1
	• conserving and reusing topsoil;	Section 5.1.1
	• controlling weeds, pest animals, and access;	Sections 5.1.5, 5.1.6 and 5.1.7
	• managing bushfires; and	Attachment 6
	• managing any potential conflicts between rehabilitation works and Aboriginal cultural heritage.	Attachment 7
	(f) detailed performance and completion criteria for the rehabilitation of the site;	Section 6
	(g) a detailed description of how the performance of the rehabilitation works would be monitored over time to achieve the stated objectives and against the relevant performance and completion criteria; and	Section 7
	(h) details of who is responsible for monitoring, reviewing and implementing the plan.	Section 9.1
	***Note**: In accordance with condition 11 of schedule 2, the preparation and implementation of Rehabilitation Management Plans is likely to be staged, with each plan covering a defined area (or domain) for rehabilitation. In addition, while mining operations are being carried out, some of the proposed remediation or rehabilitation measures may be included in the detailed management plans that form part of the Extraction Plan. If this is the case, however, then the Proponent will be required to ensure that there is good cross-referencing between the various management plans.*	
Schedule 6, Condition 2	The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	(a) detailed baseline data;	Section 7.2
	(b) a description of:	
	• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 1.4

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
	• any relevant limits or performance measures/criteria;	Section 1.4
	• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures	Section 6
	(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria:	Section 5
	(d) a program to monitor and report on the:	
	• impacts and environmental performance of the project;	Section 7
	• effectiveness of any management measures (see (c) above);	Section 7
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	LSMP section 3
	(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 10
	(g) a protocol for managing and reporting any;	
	• incidents;	Section 11.1
	• complaints;	Section 12
	• non-compliances with statutory requirements; and	Section 11.2
	• exceedances of the impact assessment criteria and/or performance criteria; and	
	(h) a protocol for periodic review of the plan.	Section 10.1 Section 10.3
Schedule 6 Condition 3	Within 3 months of the submission of an:	Section 10.3
	(a) audit under condition 7 of Schedule 6;	
	(b) incident report under condition 4 of Schedule 6; and	
	(c) annual review under condition 5 of Schedule 6; and	
	(d) any modification to the conditions of this approval (unless the conditions require otherwise),	
	the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.	
Schedule 6 Condition 4	The Proponent shall notify the Secretary in writing via the Major Projects website and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.	Section 11.1

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
Schedule 6 Condition 5	The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Secretary.	Section 10
Schedule 6 Condition 6	By the end of March each year, the Proponent must submit a review of the environmental performance of the project for the previous calendar year to the satisfaction of the Secretary.	Section 10.1
Schedule 6 Condition 7	Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project (Stages 1 and 2).	Section 10.2
Schedule 6 Condition 10	The Proponent shall: (a) make copies of the following publicly available on its website: • the documents referred to in Condition 2 of Schedule 2; • all current statutory approvals for the project; • all approved strategies, plans and programs required under the conditions of this approval; • a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs; • a complaints register, updated on a monthly basis; • minutes of CCC meetings; • the annual reviews of the project; • any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit; • any other matter required by the Secretary; and	Section 1.7
	(b) keep this information up-to-date, to the satisfaction of the Secretary.	Section 1.7

Attachment 2 Rehabilitation Risk Register

Table A2.1 - Rehabilitation Risk Register

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
1	Erosion and Sediment Control	Erosion and sediment on disturbed areas. Uncontrolled discharge offsite of sediment laden water.	Failure to undertake progressive rehab during operations. Failure of areas already rehabilitated. Less than adequate water management system and/or design. Less than adequate caveats on land management requirements post closure (REA).	Impact on rehabilitation. Pollution event offsite. Decrease in water quality.	1. Water Management Plan (including ESCP) 2. Visual observations. 3. Water quality monitoring 4. LDP monitoring. 5. Permit to work and clearing protocol - ESCP plan prepared to link	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
2	Spontaneous Combustion	Spon-com in reject emplacement area impedes rehabilitation	Poor management of materials with propensity for spontaneous combustion. Less than adequate caveats on land management requirements post closure (REA)	Inability to complete rehab. Impact on established rehab. Cost of managing spontaneous combustion outbreak. Potential risk of bushfire. Air quality/odour impacts and inability to relinquish lease.	1. Spontaneous combustion TARP 2. Stockpile Management Plan. 3. REA closure design specifications 4. REA closure design has sampled and assessed spontaneous combustion. Low propensity	**Satisfactory**	**Environment**	**3**	**E**	**6**	**Moderate**	
3	Geology and Geochemistry	Failure to achieve the rehabilitation outcome prescribed in the MOP	Less than adequate knowledge of material and its geochemistry Inappropriate placement of materials	Inability to reach closure and relinquishment of the lease.	1. Geochemistry testing in REA closure design	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
4	Geotechnical	Geotechnical stability of final landform LTA	Less than adequate rehabilitation and/or design	Inability to reach closure and relinquishment of the lease. Additional costs for rework. Safety concerns.	1. Slope Stability Management Plan. 2. REA closure design	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
5	Soil Type(s) and Suitability	Poor topsoil quality	Time required to stockpile soil, weed infested topsoil, poor management, site conditions	Inability to reach closure and relinquishment of the lease. Cost of sourcing ameliorants and alternates	1. Rehabilitation Management Plan. 2. Weed management activities.	**Satisfactory**	**Financial Impact**	**3**	**E**	**6**	**Moderate**	Topsoil stockpile balance report
6	Soil Type(s) and Suitability	Inadequate volume of topsoil to achieve the rehabilitation outcome prescribed in the MOP	Limited additional stripping opportunities due to full disturbance footprint. Poor recovery of topsoil in dehab areas (visual bund)	Inability to reach closure and relinquishment of the lease. Cost of sourcing ameliorants and alternates.	1. Topsoil stockpiles surveyed and shown on MOP Plans. 2. Topsoil management for clearance above LWs covered by PTW. 3. Cleared topsoil directly respread and used in rehabilitation effort	**Satisfactory**	**Financial Impact**	**3**	**E**	**6**	**Moderate**	Topsoil stockpile balance report

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
7	Soil Type(s) and Suitability	Dispersive soils/ topsoil material	Unsuitable soil characteristics (grading, sodicity, ESP etc) for cover construction and/or pasture land development.	Erosion of soil/topsoil placed as cover, with potential for exposure of coarse reject	1. Selective sourcing of suitable materials, or application of appropriate soil ameliorative techniques (e.g. use of lime, gypsum, etc). 2. REA closure design 3. Capping design considers this. 4. Soil assessments being undertaken as part of rehabilitation monitoring	**Satisfactory**	**Financial impact**	**3**	**E**	**6**	**Moderate**	
8	Erosional Stability of Final Capping Layer	Available soils unstable on final landform due to erosion potential.	Soil characteristics regardless of direct amelioration techniques.	Erosion of capping layer with potential exposure of coarse reject.	1. REA closure design, 400 mm layer proposed. 2. Siberia modelling done in REA closure design	**Satisfactory**	**Financial impact**	**3**	**E**	**6**	**Moderate**	
9	Seepage from REA Landform	Saturation around landform toe.	Infiltration of stormwater through capping layer formed across landform. Saline or metalliferous drainage potential from coarse reject through contact with stormwater infiltrating through capping surface.	Local instability of capping layer around toe. Impact on receiving environment through impacted seepage water quality	1. Landform design detailed in REA Capping & Closure Design (ATCW, 2020). 2. ATCW 2020 has assessed seepage, water quality and design for stability	**Satisfactory**	**Financial impact**	**3**	**E**	**6**	**Moderate**	
10	Flora and Fauna	Loss of, or alteration to existing habitats	Subsidence, erosion, weed and pests	Inability to reach closure and relinquish lease. Impacts to habitat.	1. Permit to Work 2. Land Management Plan (extraction plan) 3. Biodiversity Management Plan 4. MOP / Landscape Management Plan	**Satisfactory**	**Financial impact**	**3**	**D**	**9**	**Moderate**	
11	Flora and Fauna	Adverse impact on threatened species	Failure to manage pests, subsidence	Inability to reach closure and relinquish lease. Impacts to local populations	1. Permit to Work 2. Land Management Plan (Extraction Plan) 3. Biodiversity Management Plan 4. MOP / Landscape Management Plan	**Satisfactory**	**Environment**	**3**	**E**	**6**	**Moderate**	

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
12	Bushfire	Damage to rehab	Bushfire from external (not owned by WHC) Bushfire from spontaneous combustion / land owned by WHC, less than adequate fuel management, fire caused by site activities/equipment failure	Loss of established rehabilitation Additional costs for rework of rehab Exposed areas (erosion, sediment, dust) Damage to offset areas.	1. MOP / Landscape Management Plan 2. Bushfire prevention standard 3. Bushfire emergency response procedure 4. Consultation with RFS 5. Firefighting procedures 6. Hot work permit process 7. WHC engaged fire consultants to manage offsets, on standby and manage fuel loads	**Satisfactory**	**Financial impact**	**2**	**D**	**5**	**Low**	
13	Mine Subsidence	Failure to achieve the rehabilitation outcome prescribed in the MOP	Mine subsidence	Damage to structures and/or infrastructure following mining (roads, fencing, power lines). Additional costs.	1. Extraction plan 2. Rehab plan / MOP 3. Built Features Management Plan	**Satisfactory**	**Financial impact**	**3**	**D**	**9**	**Moderate**	
14	Mine Subsidence	Alteration of local drainage	Mine subsidence	Ponding, cracking, altered hydrological flows, altered drainage, erosion, changes to vegetation, impacts to arch sites, changes to creek bed profile.	1. Extraction plan 2. Ripping, ploughing and seeding 3. Earthworks 4. Pumping and dewatering (during operations) 5. Land Management Plan for specific areas	**Satisfactory**	**Environment**	**3**	**D**	**9**	**Moderate**	
15	Contaminated Land	Contaminated land occurring on the site at closure	Fuel use at the site Spills, leaks etc.	Impact on environment Constraint for future land use	1. Above ground storage 2. Incident reporting system 3. Bioremediation area 4. Spill kits 5. PIRMP 6. Waste Management Plan	**Requires improvement**	**Environment**	**3**	**E**	**6**	**Moderate**	Phase 1 and 2 studies at mine closure, scheduled for end 2026
16	Air Quality	Increased air borne dust resulting in non-compliance with consents	Dust created from earthworks during rehabilitation	Complaints Prosecution and fines, health impacts	1. Air quality management plan/monitoring program 2. Surface transport management plan. 3. Dust TARPs	**Satisfactory**	**Legal and compliance**	**2**	**E**	**3**	**Low**	
17	Greenhouse Gas	Ongoing greenhouse gas emissions post-closure	Less than adequate sealing of bores/mine entries/ventilation system. Failure of seals	Greenhouse gas emissions. Community complaints.	1. Borehole sealing procedure 2. Survey records 3. DRE guidelines 4. Greenhouse Gas Management Plan 5. Energy Savings Action Plan	**Satisfactory**	**Financial impact**	**3**	**E**	**6**	**Moderate**	

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
18	Noise	Increased noise resulting in non-compliance with consents	Earthworks during rehabilitation	Complaints Prosecution and fines	1. Noise Management Plan 2. Noise Monitoring 3. SPL for new and introduced equipment 4. Rehabilitation works planned for daytime only	**Satisfactory**	**Legal and compliance**	**2**	**E**	**3**	**Low**	
19	Visual Amenity	Impacts on the effectiveness of the Siding Springs Observatory	Lighting plant visible during bulk earthworks. Exposed areas visible and identifiable change to the landscape	Complaints	1. Australian standard for lighting 2. Lighting impacts reduced during closure	**Satisfactory**	**Legal and compliance**	**2**	**D**	**5**	**Low**	
20	Aboriginal Cultural Heritage	Disturbance of known/unknown Aboriginal sites	Unintended interaction with Aboriginal site due to lack of awareness	Prosecution Loss of culturally significant site Loss of reputation with stakeholders	1. ACHMP 2. Permit to work 3. Training/awareness (Toolbox Talks)	**Satisfactory**	**Legal and compliance**	**2**	**D**	**5**	**Low**	
21	European heritage	No registered European heritage sites	Nil	-	-		**Environment**	**1**	**E**	**1**	**Low**	
22	Agricultural Resources	Loss of agricultural resources (LSC Class 3 land)	Mining disturbance Possible soil contamination Erosion and sedimentation Less than adequate rehabilitation	Reduced amount of land available suitable for agricultural production Inability to relinquish lease.	1. MOP/LMP	**Satisfactory**	**Financial impact**	**3**	**D**	**9**	**Moderate**	
23	Groundwater	Groundwater pollution	Leaking/split hydrocarbon Contamination during operations Stored mine water on site/brine pumped back into old workings. Saline leaching from REA	Deterioration of groundwater quality.	1. Modelling of groundwater 2. Groundwater impact assessment 3. Product selection considers environment as far as practical (LW hydraulic fluid) 4. Water Management Plan 5. Groundwater Monitoring Program 6. REA closure design	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
24	Groundwater	Drawdown of groundwater	Dewatering	Reduced water levels within aquifers.	1. Modelling of groundwater 2. Groundwater impact assessment 3. Land ownership 4. Groundwater monitoring (SWL & quality) 5. Water Management Plan	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
25	Drought	Failure to establish rehabilitation at closure	Drought conditions when completing final rehab	Delay rehabilitation Increased cost for rework	1. Rehabilitation planning. 2. Consideration of timing of seeding 3. Endemic species seed mix	**Satisfactory**	**Financial Impact**	**2**	**D**	**5**	**Low**	
26	Surface Water	Reduction in surface water flows due to ponding on mine subsidence areas	Ponding as a result of subsidence	Erosion resulting in increases suspended solids Community complaints by users dependent on surface water flows	1. Extraction plan 2. Ripping, ploughing and seeding 3. Earthworks 4. Pumping and dewatering (during operations) 5. Subsidence Pond Management Plan for specific areas	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
27	Surface Water	Discharge of saline or contaminated water	Leaking/split hydrocarbon Leachate from REA	Deterioration of water quality Non-compliance with consents Impacts to areas downstream	1. Oil-water separator 2. Engineering design dams 3. Contact and clean water diversions 4. Sediment dams and lined brine ponds 5. Proposed to pump brine back underground at closure. 6. Water management plan	**Satisfactory**	**Environment**	**3**	**D**	**9**	**Moderate**	
28	Public safety	Public access to the site prior to final closure	Less than adequate fencing/gates Deliberate entry to property	Personal injury	1. Controlled access 2. Signs 3. No voids or major excavations that are unmanaged 4. Ongoing subsidence rehabilitation	**Satisfactory**	**Health and Safety**	**1**	**E**	**1**	**Low**	
29	Hazardous Materials and Dangerous Goods	Hazardous materials and dangerous goods remaining on the site at closure.	Failure to identify HAZMAT at closure Requirement to demolish farmhouses	Breech of licence Health and safety hazard Financial cost to remedy	1. Radiation management plan 2. ChemAlert system 3. Procurement/stock management 4. Explosive management plan 5. Emergency services manifest 6. Demolition of abandoned house on ML 1609 during operations	**Satisfactory**	**Legal and Compliance**	**2**	**D**	**5**	**Low**	HAZMAT to be assessed as part of closure and demolition requirements during detailed closure planning
30	Acid Mine Drainage (**AMD**)	Failure to achieve the rehabilitation outcome prescribed in the MOP	Less than adequate knowledge of material that may result in AMD.	Inability to reach closure and relinquishment of the lease. Requirement to treat water long term. Impact on environment.	1. Testing of material in REA 2. REA Capping & Closure Design (ATCW, 2020). has identified material as NAF	**Satisfactory**	**Environment**	**1**	**E**	**1**	**Low**	

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
31	Final Land Use	Landform profile is excessive	Landform batter slopes are too steep for livestock access	Landform becomes unavailable for livestock access Not meeting post mining land use requirements Failure to relinquish Cost to rework	1. Landform design limited slope majority 1:5 with maximum 1:4 2. REA Capping & Closure Design (ATCW, 2020). 3. Exclusion of livestock until assessed stable	**Satisfactory**	**Financial Impact**	**3**	**E**	**6**	**Moderate**	
32	Closure Performance	Closure performance monitoring indicate suboptimal results	Poor design, poor material selection and treatment and/or poor construction and vegetation	Erosional instability of capping layer with potential exposure of coarse reject Cost to rework	1. REA Capping & Closure Design (ATCW, 2020). 2. Rehabilitation monitoring program	**Satisfactory**	**Financial Impact**	**3**	**E**	**6**	**Moderate**	
33	Closure Costs	Additional cover materials are needed increasing closure costs	Available cover materials are not adequate to cover the final landform	Closure provisions are not adequate Additional cover/capping materials for REA are not available on-site requiring longer haul distances	1. Annual updates to closure costs. 2. REA Capping & Closure Design (ATCW, 2020) assessed shortfall. 3. Additional assessment (August 2019) has increased stripping depth to address shortfall 4. RCE	**Satisfactory**	**Financial Impact**	**3**	**E**	**6**	**Moderate**	Topsoil stockpile balance report
34	General	Insufficient skills and experience of rehabilitation personnel	Inadequate planning for rehabilitation	Poor quality rehabilitation Not meeting rehabilitation requirements	1.Whitehaven employs dedicated Rehabilitation Manager. 2. Suitably qualified persons prepared management plans	**Satisfactory**	**Environment**	**1**	**E**	**1**	**Low**	
35	General	Lack of defined responsibilities	Inadequate planning for rehabilitation	Poor quality rehabilitation Not meeting rehabilitation requirements	1. Responsibilities defined in Rehabilitation Plan	**Satisfactory**	**Environment**	**1**	**E**	**1**	**Low**	
36	General	Insufficient funding for or prioritisation of rehabilitation activities	Inadequate planning for rehabilitation	Poor quality rehabilitation Not meeting rehabilitation requirements	1. RCE and internal budgeting processes/plans.	**Satisfactory**	**Legal and Compliance**	**2**	**E**	**3**	**Low**	
37	Landform Establishment Growth Medium Development	Use of inappropriate machinery in rehabilitation.	Less than adequate planning and rehabilitation management	Poor quality rehabilitation.	1. Rehabilitation Manager 2. RMP 3. Engage competent personnel / contractors for rehab	**Satisfactory**	**Environment**	**2**	**E**	**3**	**Low**	

Risk ID	Key element	Risk / opportunity event	Likely cause	Potential consequence / impact	Existing preventative and / or mitigative controls	Adequacy of existing controls	Consequence category	Consequence level	Likelihood	Risk rank	Current risk rating	Additional controls
38	Ecosystem Establishment	Lack of rehabilitation maintenance.	Less than adequate planning and rehabilitation management	Poor quality rehabilitation. Rehabilitation bond is not returned. Requirement to rework rehabilitation	1. MOP/LMP 2. Rehabilitation monitoring and adaptive management 3. TARP 4. Weed and pest management	**Satisfactory**	**Environment**	**2**	**E**	**3**	**Low**	
39	Ecosystem Establishment	Weed infestations.	Less than adequate topsoil management, Less than adequate weed management	Poor quality rehabilitation. Rehabilitation bond is not returned.	1. Weed management and monitoring 2. Infestations identified and subject to weed control program 3. MOP/LMP	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
40	Ecosystem Establishment	Damage from fauna (e.g. kangaroos, feral goats, etc.) and livestock.	Less than adequate feral management Less than adequate land management	Poor quality rehabilitation. Rehabilitation bond is not returned. Damage to established rehabilitation Requirement to rework rehabilitation	1. Feral animal management 2. Annual control program - trapping and baiting	**Satisfactory**	**Environment**	**2**	**D**	**5**	**Low**	
41	Ecosystem Establishment	Insufficient establishment of target species and limited species diversity.	Less than adequate seed mix Weed infestations and competition Drought and adverse climate conditions	Completion criteria not met. Requirement for reseeding/rework Rehabilitation bond is not returned.	1. Appropriate endemic seed mix identified 2. RMP 3. Rehabilitation monitoring / TARP 4. Weed and Pest Management 5. Rehab planning for timing	**Satisfactory**	**Financial Impact**	**2**	**E**	**3**	**Low**	
42	Ecosystem Establishment	Limited vegetation structural development.	Less than adequate seed mix Weed infestations and competition Drought and adverse climate conditions	Completion criteria not met. Requirement for reseeding/rework Rehabilitation bond is not returned.	1. Appropriate endemic seed mix identified 2. MOP / Rehabilitation Plan 3. Rehabilitation Monitoring / TARP 4. Weed and Pest Management 5. Rehab planning for timing	**Satisfactory**	**Financial Impact**	**2**	**E**	**3**	**Low**	
43	Ecosystem Establishment	Overgrazing of pasture rehabilitation areas	Poor land management practices.	Poor quality rehabilitation Requirement for rework Rehabilitation bond is not returned.	1. Fencing of rehabilitated areas 2. Exclusion of livestock until stable/established.	**Satisfactory**	**Financial Impact**	**2**	**D**	**5**	**Low**	

Note: The WHC Risk Matrix, with corresponding consequence and likelihood levels, is provided in the Subsidence Risk Assessment, as Appendix K to the Extraction Plan

Attachment 3 Mine domains and rehabilitation phases

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Prepared By: SLR Consulting

Narrabri Mine
Mining and Rehabilitation - Year 2021

FIGURE A3.1

772000 773000 774000 775000 776000 777000 778000 779000 780000

6626000 6625000 6624000 6623000 6622000 6621000 6620000 6619000 6618000 6617000 6616000 6615000

EL 6243

EL 6243

PINE CREEK

LONGWALL 111
LONGWALL 110
LONGWALL 109
LONGWALL 108A
LONGWALL 108B
LONGWALL 107
LONGWALL 106
LONGWALL 105
LONGWALL 104
LONGWALL 103
LONGWALL 102
LONGWALL 101
ML 1609
LONGWALL 209
LONGWALL 208
LONGWALL 207
LONGWALL 206
LONGWALL 205
LONGWALL 204
LONGWALL 203
202
201

KAMILAROI HIGHWAY

KURRAJONG CREEK ROAD

MAYFIELD ROAD

EL 6243

LEGEND

Coal Titles
- ML 1609
- EL 6243
- Contour (5m)
- Watercourse
- Railway
- Cadastre
- Road Corridor

Mine Workings and Extraction
- Proposed Mine Workings
- Existing Extraction
- Active Mining Area
- Limit of Subsidence to 20mm

Primary
- 1 - Indicative Infrastructure Area
- 3 - Water Management Area
- 4 - Reject Emplacement Area
- 5 - Stockpiled Material
- 7 - Rehabilitation
- 8 - Underground Mining Area

Secondary
- B - Water Management Area
- D - Rehabilitation Area - Pasture
- E - Rehabilitation Area - Woodland (Existing)
- F - Rehabilitation Area - State Forest (Existing)
- J - Conservation and Biodiversity Offset Area

Rehabilitation Phase
- Phase 2
- Phase 3
- Phase 4

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

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Narrabri Mine
Mining and Rehabilitation - Year 2022

FIGURE A3.2

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Narrabri Mine
Mining and Rehabilitation - Year 2023

FIGURE A3.3

Attachment 4 Final rehabilitation for lease relinquishment

771000 772000 773000 774000 775000 776000 777000 778000 779000 780000

6626000 6625000 6624000 6623000 6622000 6621000 6620000 6619000 6618000 6617000 6616000 6615000 6614000

EL 6243

EL 6243

LONGWALL 111
LONGWALL 110
LONGWALL 109
LONGWALL 108A
LONGWALL 107
LONGWALL 106
LONGWALL 105
LONGWALL 104
LONGWALL 103
LONGWALL 102
LONGWALL 101
LONGWALL 108B
LONGWALL 209
LONGWALL 208
LONGWALL 207
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LONGWALL 205
LONGWALL 204
LONGWALL 203
LONGWALL 202
LONGWALL 201

ML 1609

KAMILAROI HIGHWAY

KURRAJONG CREEK ROAD

MAYFIELD ROAD

EL 6243

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LEGEND

Coal Titles
- ML 1609
- EL 6243
- Contour (5m)
- Watercourse
- Railway
- Road Corridor
- Mine Workings
- Limit of Subsidence to 20mm
- Aboriginal Heritage Sites

Land Capability
- Class III Land Capability

Indicative Secondary
- B - Water Management Area
- D - Rehabilitation Area - Pasture
- E - Rehabilitation Area - Woodland (Existing)
- F - Rehabilitation Area - State Forest (Existing)
- J - Conservation and Biodiversity Offset Area

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

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Narrabri Mine
Final Rehabilitation and Post Mining Land Use - 2036

FIGURE A4.1

Attachment 5 Recorded weed species with the mine site

TableA5.1 - Recorded weed species on the mine site

Scientific name	Common name	Noxious category [1]
Alternanthera pungens	Khaki Weed	-
Amaranthus retroflexus	Red-root Amaranthus	-
Arctotheca calendula	Capeweed	-
Argemone ochroleuca	Mexican poppy	-
Aster subulatus	Wild aster	-
Bidens subalternans	Greater beggar's ticks	-
Cenchrus incertus	Spiny-burr Grass	4
Cenchrus longispinus	Innocent weed / spiny burrgrass	4
Chenopodium pumilo	Fishweed	-
Chloris gayana	Rhodes grass	-
Chloris virgatus	Feathertop Rhodes Grass	-
Chondrilla juncea	Skeleton Weed	-
Cichorium intybus	Chicory	-
Cirsium vulgare	Spear Thistle	-
Citrullus lanatus	Camel Melon	-
Convolvulus remotus	Field Bindweed	-
Conyza bonariensis	Flaxleaf Fleabane	-
Cucumis myriocarpus	Paddy Melon	-
Cynodon dactylon	Couch	-
Dittrichia graveolens	Stinkweed	-
Eragrostis cilianensis	Stinkgrass	-
Eragrostis curvula	African Lovegrass	-
Fumaria sp.	Fumitory	-
Glandularia aristigera	Moss verbena / Mayne's pest	-
Gomphocarpus fruiticosus	Swan Plant	-
Gomphrena celosioides	Gomphrena Weed	-
Hibiscus trionum	Bladder Ketmia	-
Hyparrhenia hirta	Coolatai Grass	-
Hypochaeris radicata	Flatweed/catsear	-
Lepidium africanum	Peppercress	-
Lepidium sp.	Peppercress	-

Scientific name	Common name	Noxious category [1]
Malva parviflora	Mallow Weed	-
Malvastrum americanum	Spiked Malvastrum	-
Marrubium vulgare	White horehound	-
Medicago polymorpha	Burr medic	-
Medicago sativa	Lucerne	-
Melinis repens	Red Natal Grass	-
Oxalis perennans	A wood sorrell	-
Pavonia hastata	Pink pavonia	-
Petrorhagia nanteuilii		-
Rapistrum rugosum	Turnip Weed	-
Rumex crispus	Curly dock	-
Salvia reflex	Mintweed	-
Schinus areira	Pepper tree	-
Schkuhria pinnata	Dwarf Marigold	-
Setaria sp.	Pigeon grass	-
Sida rhombifolia	Paddy's lucerne	-
Sonchus asper	Prickly-sow Thistle	-
Sonchus oleraceus	Common Sow Thistle	-
Sorghum halepense	Johnson Grass	-
Tribulus terrestris	Cathead	-
Urochloa panicoides	Liverseed Grass	-
Verbena bonariensis	Purple top	-
Vicia sativa subsp. nigra	Narrow-leaved vetch	-
Xanthium occidentale	Noogoora Burr	4
Xanthium spinosum	Bathurst Burr	4
Anagallis arvensis	Scarlet Pimpernel	-
Arctotheca calendula	Capeweed	-
Avena fatua	Wild Oats	-
Bidens pilosa	Cobblers Peg	-
Bryophyllum delagoense	Mother of Millions	4
Carthamus lanatus	Saffron Thistle	-
Chloris truncata	Windmill Grass	-
Chloris ventricosa	Plum Windmill Grass	-

Scientific name	Common name	Noxious category [1]
Conyza sp.	Fleabane	-
Cyclospermum leptophyllum	Slender Celery	-
Echium plantagineum	Salvation Jane	-
Emex australis	Three-cornered jack	-
Hedypnois rhagadioloides ssp. cretica	Cretan Weed	-
Lamium amplexicaule		-
Lolium perenne	Rye Grass	-
Lycium ferocissimum	African Boxthorn	4
Medicago minima	Wooly Burr Medic	-
Medicago praecox	Small Leaf Burr Medic	-
Medicago truncatula	Barrel Medic	-
Opuntia stricta var. stricta	Prickly Pear	4
Oxalis corniculata	Creeping oxalis	-
Paspalum dilatatum	Paspalum	-
Paspalum distichum	Water Couch	-
Pennisetum villosum	Feathertop	-
Phalaris paradoxa	Paradoxa Grass	-
Polygonum aviculare	Wire Weed	-
Rumex brownii	Swamp Dock	-
Sclerolaena birchii	Galvanized Burr	-
Silybum marianum	Variegated Thistle	-
Soliva sessilis	Bindi	-
Trifolium arvense	Haresfoot Clover	-
Trifolium campestre	Hop Clover	-
Trifolium tomentosum	Wooly Clover	-
Triticum aestivum	Wheat	-
Verbena aristigera	Moss Verbena	-
Verbena officinalis	Common Verbena	-
Verbena rigida	Veined Verbena	-

Note: Noxious weed status at the time of survey

Attachment 6 Bushfire management strategy

Bushfire management strategy

The bushfire management strategy for Narrabri Mine has been developed to identify all hazards and risks associated with bushfires for all properties owned by NCOPL. The Narrabri Mine bushfire management objectives are:

- regularly monitoring and maintaining areas where bushfire hazards are identified;
- containing fire outbreaks related to the mine; and
- protect surrounding properties from fire damage originating from NCOPL owned land.

The General Manager has overall responsibility for the mining operation, including the responsibility for compliance in regard to bushfire management. The General Manager will ensure that all safeguards and controls are in place for the prevention of bushfires and that the desired environmental outcomes are achieved.

Potential cause of bushfire

The following are recognised as potential causes of bushfire:

- fires on plant and equipment and/or occurring as a consequence of maintenance activities of plant or equipment;
- spontaneous combustion from stockpiled coal;
- underground explosion;
- inappropriate staff behaviour i.e. smoking on site (which is in breach of site rules) and/or undertaking activities without adequate controls;
- unrelated mining incidents e.g. lightning strike and ember attack;
- fire from adjacent land holdings; and/or
- ‘Hot Work’ activities.

Controls

NCOPL understand the need to follow adequate bushfire control measures to minimise potential bushfire hazards of the mine. These control measures are discussed below.

Mobile equipment

All earth moving machinery operating on the mine will be required to be:

- operated in accordance with the Narrabri Mine Mobile Equipment Standard, the Surface Transport Principal Mining Hazard Management Plan and the Introduction to Site Standard;
- where deemed required by risk assessment, heavy machinery may be fitted with independent fire suppression systems;
- parked on cleared or slashed ground (where practicable); and
- avoid driving or operating in long grass (where practicable).

Other mobile equipment

Other mobile equipment will be managed by:

- compressors and generators must be positioned on a pad cleared of all flammable material;
- all cutting and welding activities will be confined to the main workshop area; and
- if welding or cutting of materials is required outside of the main workshop area, a fire tender or water cart with fire suppression capacity should be in a position to respond during the welding or cutting operations.

Hot works

'Hot Work' away from the hot work workshops or fixed plant areas will not be authorised on 'Total Fire Ban' days.

Fixed plant and buildings

All fixed plant and buildings will be required to meet the Building Code of Australia (**BCA**) and comply with Australian Standard AS2419 and related Australian fire system standards. Where necessary, critical electrical control equipment will be protected by an automatic detection gas deluge system.

Fuel and oil management

Fuel and oil storage areas will be:

- located and constructed in accordance with the requirements of Australian Standard 1940-2004;
- signposted as to the contents of the materials and will be fitted with 9kg fire extinguishers; and
- fully self-bunded (fuel tanks) to ensure that if leakage or rupture occurs, no fuel can escape from bunded areas.

Firefighting system

A firefighting system is available around the workshop/stores area and the coal processing area.

Smoking on-site

Smoking is a potential source of ignition. To minimise this risk, the mine is a non-smoking site and there are no designated smoking areas.

Spontaneous combustion

To reduce the potential for spontaneous combustion of coal stockpiles, the following measures will be implemented:

- coal will be routinely turned over in the ROM and product coal stockpile areas to minimise stockpile storage time;

- longer term stockpiles will be shaped with a battered face created in the direction of the prevailing winds;
- the stockpile area will be compacted by the use of mobile equipment; and
- regular visual inspections for evidence of combustion (visual and smell) will be undertaken.

To reduce the potential for spontaneous combustion of the underground longwall panels and associated gas drainage systems, the following has been advised within the Environmental Assessment (R.W. Corkery & Co. 2009):

- the mine design should employ a low resistance ventilation system achieved through a seven heading mains trunk and two heading gate roads.
- small diameter ventilation shafts are to be installed at the rear of every third gate road panel for ventilation of the gate road in bye of the active longwall face thus negating the need for a bleed system skirting the perimeter of the goaf.
- pre- and post- (goaf) gas drainage systems are to be implemented for gas management purposes thereby minimising ventilation pressures that would result if the ventilation system only were used to maintain gas concentration to acceptable levels.
- planned installation of high standard ventilation control devices.
- installation, operation and maintenance of a dual ventilation monitoring system (telemetric and tube bundle).
- on-site gas chromatograph available.
- on-site inertisation capability:
  - pipework and valves fitted to all goaf seals to allow the injection of inert gas
  - potential utilisation of in-seam drainage ranges
  - access to Thomlinson Boiler and PSA Nitrogen gas generators, if required
- implementation of ventilation and monitoring arrangements and the related spontaneous combustion procedures and action response plans
- implementation of a Gas Drainage and Outburst Management Plan which would:
  - define acceptable negative pressures at the collars of in-seam boreholes
  - establish methods of intersecting and management of in-seam boreholes (R.W. Corkery & Co. 2009).

Emergency vehicle access

To control fires that may occur on the mine, the following measures will be implemented for emergency vehicle access:

- access for emergency vehicles will be required and maintained around all mining related activities;
- clear access for emergency vehicles will be required around buildings associated with the mine; and
- access gates will be required for emergency vehicles to gain access to the underground mining area in the event of a bushfire that may occur in this area.

Remnant vegetation

Where remnant vegetation can be found, the following protocol will be followed:

- fuel loads will be monitored at 6-monthly intervals, with an inspection prior to the beginning of each bushfire season;
- access for emergency vehicles through gates to this area for firefighting purposes will be required
- a graded fire break will be maintained along the boundary to a minimum width of 6 m; and
- if fuel levels are identified as unacceptable, a fuel reduction burn may be implemented through consultation with the local Rural Fire Service (RFS) and NSC.

Stock grazing

Grazing stock on NCOPL owned properties requires grazing at sustainable stocking rates to reduce pasture fuel loads and fire risk from entering and leaving the NCOPL properties. This grazing regime will be maintained for the long-term and will be influenced by seasonal variation.

The pit top area and active longwall mining areas (remnant vegetation, riparian, and infrastructure management areas) will not be grazed as this will interfere with mining activities. Pasture areas in the pit top area and underground longwall area may need to be slashed to reduce pasture growth during summer months.

Firefighting equipment

The following requirements will be followed for firefighting purposes on the mine:

- a provision of fire equipment will be kept on-site in accordance with the Fire Fighting Equipment Standard;
- all firefighting equipment will be kept in operational condition and be inspected as required by the Fire Fighting Equipment Standard; and
- a surface water truck equipped with water cannon will be maintained on site to provide an immediate response to a bushfire if safe to do so (refer to the Bushfire Emergency Response Procedure).
- All surface equipment able to provide water during an emergency should have 65mm Stortz fittings available. The minimum firefighting equipment requirements at Narrabri Mine are defined in the Fire Fighting Equipment Standard which make provision for:
- 30 m x 60 mm fire hoses
- 30 m x 35 mm fire hoses to allow two hoses with two nozzles to be used simultaneously
- breaching piece with manually operated cut-off valves
- branch pipes and nozzles with 12 mm diameter outlets and suitable spanners
- diffusers
- 80 BE fire extinguishers
- approved foam making compound
- approved foam making branch applicator
- 60 mm to 35 mm hose adaptor.

Water supply

Water for firefighting purposes will be sourced from various water storages within land owned by NCOPL.

Fire breaks

Suitable fire breaks will be established and maintained around the perimeter of the mining lease or associated landholdings and any flammable materials storage areas. These fire breaks will be:

- a minimum of 6 m wide;
- clear earth breaks free of flammable material; and
- maintained at 6 monthly intervals and prior to the fire season.

Staff training

Training associated with fire control will include:

- all mine personnel, visitors and sub-contractors will be advised of emergency assembly points in the case of an emergency; and
- mine fire teams will be formed and trained in accordance with coal mining legislation.

Training on bushfire awareness will be provided to site personnel working in areas that have a high bushfire prone risk. Training may include the NSW RFS 'Bushfire Awareness Training'. All training, competency assessment and maintenance of training records in relation to this Standard must be conducted in accordance with the requirements of the Training and Competency Principal Control Plan. The Training and Competency Principal Control Plan defines the induction and training requirements for each classification of employee based on the type of work and the work environments that each classification is exposed to.

External assistance

In the event that a fire cannot be controlled by mine firefighting teams, or that threatens surrounding private or public property, the emergency procedures identified in the NCOPL Fire and Emergency System will be followed. This will include the evacuation of all staff from the property and notification of external emergency services.

Reporting

The mine will liaise with the local RFS located in Narrabri and report on bushfire management measures, as required. Bushfire management actions will be discussed in the Annual Review.

Monitoring

Table A6.1 describes the Narrabri Mine bushfire monitoring program.

Table A6.1 - Bushfire strategy monitoring requirements

Bushfire strategy	Monitoring action	Monitoring frequency
Mobile equipment	• exhaust systems and spark arrestors functioning adequately • all vehicles fitted with appropriate fire extinguishers	Monthly
Fixed plant and buildings	All plant and buildings fitted with appropriate fire extinguishers	Monthly
Fuel and oil management	• contents of fuel and oil storage identified • appropriate fire extinguishers fitted • foam generator in working order • adequate supply of high expansion foam available	Monthly
Spontaneous combustion	• ensure regular turn-over of coal stocks • visual inspections for combustion	Weekly
	• long-term stockpiles battered • stockpile area compacted by mobile equipment	Monthly
Emergency vehicle access	Access for emergency vehicles maintained	6 monthly
Remnant vegetation	Visual assessment of fuel loads	6 monthly
Firefighting equipment	• firefighting equipment available meets the requirements of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.	Yearly
	• firefighting equipment in operational condition	Monthly
Water supply	Water supplies available	Monthly
Fire breaks	Fire breaks established and maintained to standards	6 monthly
Staff training	Fire training requirements implemented	As required
	Fire teams formed and operational	6 monthly

Attachment 7 Aboriginal cultural heritage management

Aboriginal cultural heritage management

Aboriginal cultural heritage is currently managed in accordance with the Aboriginal Cultural Heritage Management Plan (**ACHMP**) which has been developed in consultation with Registered Aboriginal Parties (**RAPs**), DPE and Heritage NSW.

Numerous Aboriginal cultural heritage assessments have been undertaken, both prior to construction of the mine and prior to extraction of individual longwall panels. All assessments and surveys are undertaken by suitably qualified archaeologists and involve representatives of the local Aboriginal community. Rehabilitation works will be undertaken in accordance with the ACHMP which includes the following measures:

- NCOPL staff and contractors will undertake Cultural Awareness training as part of the general mine site induction;
- implement the 'Permit to Work - Surface Disturbance and Penetration Work' which cross references proposed disturbance areas and recorded Aboriginal sites; and
- replace artefacts at the flagged point once subsidence impacts have occurred/rehabilitation of the subsided area has been undertaken as agreed by the RAPs.

Additional measures to ensure compliance with the requirements of the *National Parks and Wildlife Act 1974*, EP&A Act and the conditions of Project Approval include:

- identification of sites on plans kept in the Administration building for ease of access;
- sites determined to be of high significance as agreed between Narrabri Mine, the registered Aboriginal stakeholders and an archaeologist will be pegged, fenced and identified as an 'Environmental Protection Zone';
- undertake all salvage works, which requires the approval of the Secretary, in accordance with requirements of Project Approval;
- undertake regular consultation with stakeholders; and
- undertake regular reviews of the ACHMP.

In the event of inadvertent damage to any Aboriginal site or place, the activities causing the damage would cease immediately and procedures identified in the ACHMP followed. Subject to the nature of the damage, appropriate professional advice in addition to that provided a consultant archaeologist may be sought.

Aboriginal cultural heritage will be monitored in accordance with the ACHMP, and the results summarised in the Annual Review.

Attachment 4 Mine Closure Plan

NARRABRI MINE

EXTRACTION PLAN
MINE CLOSURE PLAN

PANELS 201 - 202

Prepared by:

Title	Name	Signature	Date
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Director	Mark Vile Onward Consulting		30 March 2022

Onward document number:
NCO-004H-0 PLN

Document review history

In accordance with Project Approval Schedule 6 Condition 3, this document has been reviewed as follows:

Review Date	Reason for review	Reviewed by	Revision required (Y/N)

Acronyms and abbreviations

Acronym	Description
AIP	Aquifer Interference Policy
BCS	The Biodiversity Conservation and Science Directorate within DPE
BOA	Biodiversity Offset Area
CHPP	Coal Handling and Preparation Plant
DAWE	Commonwealth Department of Agriculture, Water and Environment
DGS	Ditton Geotechnical Services
DPE	The NSW Department of Planning and Environment
DPE Water	The Water group within DPE
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
GAB	Great Artesian Basin
ha	hectare
km	kilometre
LW	longwall panel
m	metre
MCP	Mine Closure Plan (this document)
ML	mining lease
mm	millimetre
mm/m	millimetre per metre
Mt	million tonnes
Mtpa	million tonnes per annum
NCOPL	Narrabri Coal Operations Pty Ltd
NSC	Narrabri Shire Council
NSW	New South Wales
RMP	Rehabilitation Management Plan
SoC	Statement of Commitments
SIA	social impact assessment
ROM	run of mine
TARP	trigger action response plan
WHC	Whitehaven Coal Limited
WMP	Water Management Plan

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1. Introduction

1.1 Background

The Narrabri Mine is an existing underground coal mining operation situated in the Gunnedah Coalfield. It is located approximately 25 kilometres (**km**) south-east of Narrabri and approximately 60 km north-west of Gunnedah, within the Narrabri Shire Council (**NSC**) Local Government Area in New South Wales (**NSW**). The Narrabri Mine includes an underground coal mine, a coal handling and preparation plant (**CHPP**) and associated rail siding and surface infrastructure.

The Narrabri Mine is operated by Narrabri Coal Operations Pty Ltd (**NCOPL**), on behalf of the Narrabri Mine Joint Venture, which consists of two Whitehaven Coal Limited (**WHC**) wholly owned subsidiaries, and other joint-venture partners[1]. The underground mine is covered by Mining Lease (**ML**) 1609 which covers an area of 5,298 hectares (**ha**) for the predominant purpose of mining for coal from the Hoskissons Coal Seam.

Stage 1 of the Narrabri Mine was approved in November 2007 under Part 3A of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**). Construction of the mine and supporting infrastructure commenced in 2008, with production using a continuous miner following in 2010. Following the approval of the Stage 2 Environmental Assessment (R.W Corkery & Co., 2009) (the **EA**) and the issue of Project Approval 08_0144 for Stage 2 (**Project Approval**) in July 2010 and EPBC approval (2009/5003) in January 2011, the Narrabri Mine was converted to an 8 million tonnes (**Mt**) per annum (**Mtpa**) run of mine (**ROM**) longwall mining operation, which commenced in 2012.

The Project Approval has subsequently been modified on a number of occasions. The environmental assessment for Modification 5 (Resource Strategies, 2015) (**MOD 5**), approved in December 2015, changed the mine geometry by reducing the number of longwall (**LW**) panels from 26 to 20, increased some LW panel widths and increased the production to 11 Mtpa of ROM coal until July 2031.

Modification 7, the most recent modification of the Project Approval, was approved on 23 November 2021. The environmental assessment for Modification 7 (Resource Strategies, 2021) (**MOD 7**) describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and instead allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205[2]. The bord and pillar mining will occur concurrently with longwall operations and is scheduled to commence in 2022 for a period of approximately five years. There is no change to the previously approved longwall panels LW 203 to LW 205. The maximum ROM coal production rate of the concurrent operation remains within the approved limit of 11 Mtpa.

The Extraction Plan provides further details of the Narrabri Mine operations to date; a consideration of the applicable statutory requirements and the modifications to the Project Approval; and information relevant to the extraction of coal from pillar reduction panels CF 201 to CF 205 (hereafter referred to as **Panels 201 to 202**). The surface area predicted to be affected by the proposed secondary extraction of Panels 201 to 202 has been defined as the **Extraction Plan Area**.

The underground mining layout for Panels 201 to 202 is presented in Figure 1.1.

[1] For full details on the joint venture ownership, please refer to the introduction of the Extraction Plan.

[2] The pillar reduction panel naming 'CF' is an acronym for 'cut and flit'.

Source: Geoscience Australia (2011); NSW Spatial Services (2019)

LEGEND

— — Underground Mine Footprint

—E— Electricity Transmission Line (Constructed)

ONWARD CONSULTING

NARRABRI COAL MINE

Figure 1.1 : Underground Mining Layout for Panels 201 and 202

1.2 Purpose and scope

As required by Project Approval Schedule 6 Condition 2, this Mine Closure Plan (**MCP**) for Panels 201 to 202 has been prepared in accordance with the NSW Department of Planning and Environment (**DPE**) *Draft Guidelines for the Preparation of Extraction Plans* (unpublished) (**Extraction Plan Guidelines**). It complies with Schedule 3 Condition 4(g) of the Project Approval, which states that, as part of the Extraction Plan and to the satisfaction of the NSW Resources Regulator, appropriate revisions are to be made to the Landscape Management Plan (**LSMP**) as required under Schedule 5 Condition 3. The LSMP in turn must include an MCP, developed in accordance with the requirements of Schedule 5 Condition 5, as described in section 1.4.1.

This revision of the MCP builds on previously approved mine closure plans for LW 101 to 110, prepared between 2011 and 2019. It should be noted that the management domains for the mine site in these previous versions of the mine closure plans have been amended to be consistent with the current Mining Operations Plan (**MOP**) which has been prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines* (NSW Trade and Investment, 2013) (**MOP Guidelines**). The redefined mine domains are presented in section 2 of the LSMP.

1.3 Objectives

The MCP should be considered a template on which future activities are to be based. The principal objectives of mine closure planning incorporated into this MCP are:

- to ensure that adequate financial provision is made available to cover the cost of decommissioning, final rehabilitation and any other post closure costs related to the closure of the Narrabri Mine;
- to establish clear and agreed criteria with all relevant stakeholders, which can be used as the standard to assess the final mine rehabilitation and post mining land use against;
- to reduce or eliminate adverse environmental effects once the mine ceases operation;
- to ensure closure is completed in accordance with good industry practice as well as meeting the statutory requirements that may be applicable; and
- to ensure the closed mine does not pose an unacceptable risk to public health and safety.

The key planning aspects required for mine closure include:

- integrating the closure design for the entire mine site;
- identifying the timing of the planning process;
- considering issues which relate to specific rehabilitation methods;
- considering economical and community objectives; and
- ensuring adequate financial provisions have been set aside.

NCOPL will implement all practical measures to prevent and/or minimise any harm to the environment that may result from construction, operation or rehabilitation activities at the Narrabri Mine.

1.4 Statutory requirements

This MCP has been prepared in accordance with the applicable conditions and requirements of the Project Approval, EPBC 2009/5003, ML 1609 and all relevant legislation and guidelines as set out in the following sections. A full consideration of the applicable compliance requirements is provided in section 2 of the Extraction Plan.

1.4.1 Project Approval

Project Approval Schedule 5 Condition 5 requires NCOPL to develop an MCP which must comply with the following requirements, as addressed in the referenced sections:

(a) define the objectives and criteria for mine closure;

(b) investigate options for the future use of the site;

(c) provide a detailed methodology for decommissioning the site's evaporation/storage ponds and the treatment of any accumulated salt within or around those ponds;

(d) investigate ways to minimise the adverse socio-economic effects associated with mine closure, including reduction in local and regional employment levels;

(e) describe the measures that would be implemented to minimise or manage the ongoing environmental effects of the Narrabri Mine; and

(f) describe how the performance of these measures would be monitored over time.

In accordance with Condition 11 of Schedule 2, this MCP has been specifically revised for the extraction of Panels 201 to 202 however continues to be applicable to the whole Narrabri Mine. It is supported by the suite of other management plans that are appended to, and form part of, the Extraction Plan, in particular the Rehabilitation Management Plan (**RMP**).

The Project Approval conditions directly relevant to this MCP have been presented in full in Table A1.1 in Attachment 1, together with a cross-reference where the requirements are addressed within this Plan.

Statement of Commitments

The Statement of Commitments for Site Operations and Management (**SoC**) is contained as Appendix 3 of the Project Approval. As part of the MCP, NCOPL has committed to decommissioning and removing the infrastructure and services no longer required for ongoing activities on the land subject to the ML. These SoCs are also further discussed in the RMP, provided as Attachment 1 to the LSMP.

1.4.2 EPBC approval

The Narrabri Mine is subject to EPBC 2009/5003 issued under the EPBC Act. Approval Condition 6 states that NCOPL must develop must submit and implement an MCP within 12 months prior to the cessation of operations. The MCP must have consideration of matters protected under the EPBC Act at this time and ensure that these matters will not be significantly impacted by the mine closure. The final version of the MCP must be submitted to Commonwealth Department of Agriculture, Water and Environment (**DAWE**).

Operations at Narrabri Mine are approved to continue until 2031 and, as such, Condition 6 is not applicable to this version of the MCP. However, it should be noted that as required by EPBC 2009/5003 Condition 3, a copy of the Extraction Plan as approved by the NSW Department of Planning and Environment (**DPE**), which includes this MCP, is to be provided to DAWE.

1.4.3 Mining lease

The original ML 1609 issued in 2008 has been amended to include a reference to Extraction Plans, removing the requirements for a Subsidence Management Plan. There are no specific ML conditions related to this MCP. All requirements relevant to mine closure in ML condition 3, which stipulates the preparation of a MOP, are addressed in the MOP.

1.4.4 Extraction Plan Guidelines

There are no specific references to or requirements for an MCP identified in the Extraction Plan Guidelines.

1.5 Risk assessment

A subsidence risk assessment has been undertaken to identify the risks associated with subsidence at the Narrabri Mine. It builds on previous risk assessments completed for LW 101 to LW 110 and is presented as Appendix K to the Extraction Plan. The updated risk assessment for Panels 201 to 202 has not identified any high-risk items and, as a result, risks associated with subsidence within the Extraction Plan Area for the Narrabri Mine have been assessed as low to moderate.

A risk assessment focussed on rehabilitation and mine closure was undertaken in August 2020. This is further discussed in section 3 of the RMP, with the risk register presented in Attachment 2 of the RMP.

1.6 Consultation and approval

Schedule 5 Condition 3(d) of the Project Approval requires the LSMP to include an MCP (this Plan). Schedule 5 Condition 3(c) in turn states that the LSMP (including the MCP) is to be prepared in consultation with the Water group within DPE (generally referred to as **DPE Water**), the Biodiversity, Conservation and Science Division (**BCS**) within DPE and NSC, to the satisfaction of the Secretary and the Resources Regulator.

A draft (Revision B) of the LSMP (including the RMP and MCP) was provided for consultation on 3 December 2021. No comments were received on the RMP and MCP. The consultation correspondence is provided in Attachment 2 of the LSMP.

The overall consultation process required for the Extraction Plan by the Project Approval is detailed in section 1.9 of the Extraction Plan.

1.7 Access to information

In accordance with Schedule 6 Condition 10 of the Project Approval, the approved Extraction Plan and all appendices, audits and reports, and summaries of all monitoring data (where relevant) will be made publicly available on the WHC website. All information will be kept up to date.

Note that any printed copies of this MCP are uncontrolled.

2. Mine closure planning

2.1 Mine closure objectives

The key mine closure objectives for Narrabri Mine are:

- achievement of acceptable post-disturbance land use suitability – mining and rehabilitation will aim to create a stable landform with land use capability and/or suitability similar to that prior to disturbance, unless other beneficial land uses are pre-determined and agreed;
- creation of safe and stable post-disturbance landform - disturbed land will be rehabilitated to a condition that is self-sustaining or one where maintenance requirements are consistent with the agreed post-mining land use(s); and
- preservation of downstream water quality – surface and groundwater that leave the Mining Lease are not degraded to a significant extent. Current and future water quality will be maintained at levels that are acceptable for users downstream of the site.

2.2 Conceptual final land use options analysis

As required under Schedule 5 Condition 1 of the Project Approval, all areas disturbed within the ML are to be rehabilitated to a state that restores ecosystem function, including maintaining or establishing self-sustaining native ecosystems comprising local native plant species and a landform consistent with the surrounding environment. For the purpose of this MCP, it is assumed that all mining related infrastructure will be removed from the surface facilities area and the area revegetated to pasture (in accordance with the RMP). A conceptual post closure final landform is provided in Attachment 2.

A final MCP will be prepared when the mine is within 5 years of closure. At this time, options for future post mining uses of infrastructure areas at the surface facilities locations, and potential retention, will be investigated and considered.

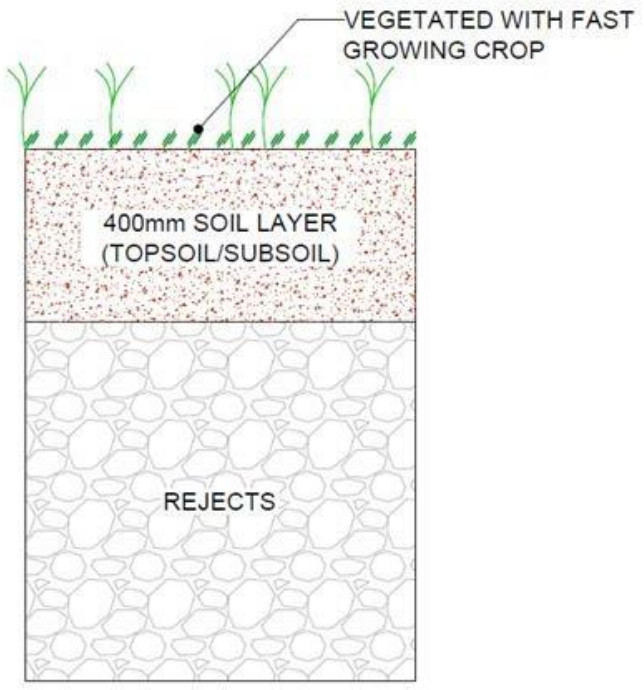
2.3 Reject Emplacement Area detailed closure design

At mine closure, the reject emplacement area (**REA**) will be capped and rehabilitated in accordance with the *Narrabri Reject Emplacement Area Capping Assessment and Closure Design* (ATC Williams, 2020) (**REA closure design**), as amended and updated to suit. The detailed closure design has been developed in consultation with the Resources Regulator and was developed based on material characterisation and modelling outcomes and addresses the final REA landform and capping configuration for the completed landform at full capacity.

The completed landform design forms the basis for the closure and capping works to be undertaken progressively as each ‘cell’ is formed and reaches capacity. The key closure design criteria are summarised in Table 2.1, with the proposed capping configuration presented in Figure 2.1.

Table 2-1 - REA closure design criteria summary

Design aspect	Criteria / features
Landform attributes	• Maximum height 15 m • Footprint area 25 ha • External batters nominally 5H:1V • Internal (operational) batters 2H:1V
Capacity	• Total airspace availability 3.4 million m^3 (based on design landform) • Capping volume 98,000 m^3 • Available reject material capacity 3.3 million m^3
Capping configuration	• Base case comprising 400 mm thick soil layer using clay capping material borrowed from topsoil and subsoil stripping from the REA development area • Revegetation by hydromulch (with tackifier) grass cover; species selection appropriate for soil properties and local climate conditions
Stormwater management	• External perimeter drain (clean water diverted around REA for release) • Internal perimeter drain (site water directed to sediment basin [(SB3 – refer to the Water Management Plan (WMP) during operations; offsite release post-closure)] • Contour drains on batters, discharging to internal perimeter drain • Swale drains on plateau surface discharging to contour drains



Source: ACT Williams 2020

Figure 2.1 - Proposed capping configuration for REA landform

2.4 Socio-economic effects associated with mine closure

NCOPL recognise that closure of the mine is likely to have some impact on the local community; however, the socio-economic impacts on the area after the Narrabri Mine closure will depend on the structure of the mining and resource sector at the time.

A strategy will be prepared at least 5 years prior to mine closure to prevent or mitigate adverse impacts upon the local community and the existing workforce. The strategy will include a social impact assessment (**SIA**) and comprehensive and sustainable initiatives to be implemented. The SIA will consider the following keys issues:

- the demands and contributions of the mine on local services to better assess the impacts of closure on those demands and contributions;
- establishing a benchmark for retention of economic activity within the area;
- studies/monitoring of social contributions and sustainability post closure;
- relationships with local suppliers;
- communication with the workforce regarding closure, including key staff retention, redundancy, employment transfer, career training and advice, and counselling;
- stakeholder consultation regarding post-mining land use and incorporation of consultation outcomes into a final mine closure plan; and
- the nature of the current economic / social contribution compared to the future contribution / loss of contribution post closure.

3. Mine closure management

3.1 Management phases

The rehabilitation and mine closure process can be described as a sequence of conceptual phases within each management domain (described in section 3.2) to achieve the proposed completion criteria for mine closure which are specified in section 4. These phases are reflective of the MOP and are described in Table 3.1.

Table 3-1 - MOP management phases

Description	Quality assurance reporting
Phase 1 - Demolition	
The process of removing plant and equipment from active services and rendering the area safe	• documentation of mine and borehole sealing; • documentation showing all subsidence pegs have been removed; • inspections and demolition reports to confirm all infrastructure to be demolished has been removed; • documentation to confirm all remaining inert, unrecyclable wastes have been either taken to a licensed landfill or buried in the backfill of the box-cut in accordance with Resources Regulator requirements; • documentation to confirm all carbonaceous material has been removed from the surface of the site and disposed of in the box cut with at least 5m of inert cover; • certificates of disposal to confirm all hazardous materials have been removed from site; • phase 2 contamination assessment report for any contaminated areas have been remediated to an appropriate standard commensurate with the post mining land use; and • documentation to identify the future landowner responsible for the ongoing upkeep and management of any retained infrastructure.
Phase 2 - Landform establishment	
The process of shaping material into a desired land surface profile. This includes earthworks activities such as cut and fill, rock raking, water storage and drainage construction.	• survey and preparation of as constructed drawings of final constructed slopes, landforms and water drainage structures; • geotechnical report completed by qualified person shows that the post-mining landform is stable and slopes are stable for agreed post-mining land use; • documentation of any subsidence remediation in accordance with the extraction plan; and • documentation confirming the REA has been capped in accordance with specifications.
Phase 3 - Growth medium establishment	
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 soil and applying ameliorants.	• maintenance of a topsoil inventory to document stripped, stockpiled and re-spread resources; • site records of re-spread topsoil, ameliorants, fertiliser etc.; • documentation confirming habitat features (hollow bearing logs, felled timber not mulched and large rocks) were salvaged during pre-stripping operations for re-use where practicable; and • soil testing results to confirm appropriate soil geochemical parameters for plant establishment.

Description	Quality assurance reporting
Phase 4 - Ecosystem and land use 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.	• documentation of reseeding or planting activities undertaken; • soil testing results to confirm appropriate soil geochemical parameters for plant establishment and growth; and • site inspections of rehabilitated areas to identify any emerging threats to rehabilitation.
Phase 5 - Ecosystem and land use sustainability	
The process of applying management techniques to encourage an ecosystem to grow and develop towards a desired and sustainable post mining land use outcome. Incorporates features including species reproduction, nutrient recycling and community structure.	• inspections of erosion and sediment controls; • inspections to identify potential weed infestations; • documentation of rehabilitation Monitoring; and • documentation of weed and feral animal management and eradication programs and follow-up inspections.
Phase 6 - Land relinquishment	
The completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished from the mining tenement.	• final rehabilitation assessment and record of findings to ensure all objectives have been met; • completion and submission of *ESF2: Rehabilitation completion and notification of mine site closure* • records of meeting with the Resources Regulator to discuss the outcomes of the ESF2 rehabilitation and address any outstanding issues that may potentially exist; and • records of meeting with relevant Government agencies to obtain consensus that the necessary requirements have been fulfilled and that no further work is required.

3.2 Mine closure management domains

Primary and secondary domains have been defined in accordance with the methodology prescribed in the MOP Guidelines. As such, the following applies:

- **Primary Domains (Operational Domains)** - are defined on the basis of land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics (i.e., during mining); and
- **Secondary Domains (Post Mining Land Use Domains)** - are defined as land management units characterised by a similar post mining land use objective (i.e., following mining).

Accordingly, domains have been defined considering the operational function and specific final land use objectives. Since the domains apply to both the RMP and the MCP, they have been listed in the (overarching) LSMP, section 2.

3.3 Key mine closure activities

The key mine closure activities within each domain have been identified and are summaries in Table 3.2.

Table 3-2 - Key mine closure activities

Code	Domain	Key closure activities
1	Infrastructure Area	At closure, all surface infrastructure will be decommissioned, dismantled, and removed from the mine site unless retained for beneficial post mining land use has been identified. Retained infrastructure would have an identified landowner (with responsibility for the ongoing maintenance) and will be made safe and appropriate for the post mining land use and will be agreed for retention with Resources Regulator. Key mine closure activities in the infrastructure domain will include: • disconnection and termination of services (e.g., water and electricity); • demolition and removal of site offices and facilities; • removal of the Namoi River water pipeline; • demolition and removal of coal handling infrastructure; • removal of other concrete pads and footings, if required; • removal of access roads, laydowns and carpark, if required; • sealing of boreholes and the box cut; • backfilling of the box cut; • removal / remediation of contaminated / hazardous materials; • stripping of carbonaceous material in the coal stockpile area to at least 0.5 m.
3	Water Management	Schedule 5 Condition 5(c) requires the MCP to provide a detailed methodology for the decommissioning of the site's evaporation / storage ponds and the treatment of salt within or around these ponds. Detailed investigation will be undertaken during detailed mine closure planning; however, the key mine closure activities regarding evaporation / storage ponds are summarised below: • accumulated salt in the evaporation/storage ponds will be excavated and either placed within the drifts or box-cut prior to backfilling or reinjected back into the goaf; • the high-density polyethylene plastic liner of each dam will be removed and transported to a waste disposal facility; • studies will be undertaken to ensure that the risk of contamination is minimal and develop appropriate contingency measures as required; • the dam areas will be inspected and sampled to analyse ground beneath each dam or pond to confirm no leakage has occurred over the life of the pond; • should saline contamination be identified, it will be removed and disposed of within the backfilled box cut; • should tests confirm no saline contamination the area will then be rehabilitated by back filling and reshaping to achieve the prescribed final landform; and • as shown in Attachment 2, some erosion and sediment control dams may remain across the site to ensure that water leaving disturbed areas is adequately treated during closure and beyond.

Code	Domain	Key closure activities
4	REA	At closure, the REA will be capped and rehabilitated in accordance with the *Narrabri Reject Emplacement Area Capping Assessment and Closure Design* (ATC Williams, 2020) as summarised in section 2.3.
5	Stockpiled Material	Stockpiled material will be stripped, and the material reused for rehabilitation of the site. Following completion, the area will be reshaped and seeded to the final land use.
7	Rehabilitation Areas	Ongoing management and maintenance of this area will be required beyond closure of the mine. Typically, this will constitute applications of fertiliser and weed management requirements over a five-year period. However, this will vary depending on the extent of weed infestation and establishment and progression of target vegetation species to the rehabilitation completion criteria.
8	Underground Mining Area	Subsidence management and monitoring will be undertaken in accordance with the relevant approved Extraction Plan. Any ground disturbance indicated by surface cracking caused by subsidence will be progressively rehabilitated.

3.4 Post-mining land use goal

The final land use goal is to create a physically and chemically stable mine landform that is adequately drained and integrates with the surrounding landform, with all mine induced subsidence remediated and rehabilitated. The rehabilitation of disturbed areas will be planned to deliver final land uses that achieve biodiversity and agricultural outcomes. Rehabilitated landforms will also integrate with the adjoining State Forests to enhance regional biodiversity and conservation outcomes. Approximately 1,630 ha of agricultural land will be re-established to a comparable land capability to that of the pre-disturbance environment [(Land and Soil Capability (**LSC**) Class 3)] at mine closure.

The western extent of the ML will become part of the onsite Biodiversity Offset Area (**BOA**) and will include:

- 431 ha of onsite offsets containing woodland vegetation and threatened fauna habitat which will not be directly or indirectly affected by the mine; and
- 1,168 ha of woodland vegetation that will be subject to potential subsidence impacts.

In addition, an offsite BOA (the “Kenna” property) has been established which covers an area of 1,244 ha. This results in a total Narrabri Mine offset area of 2,843 ha.

3.5 Management of ongoing environmental effects

Maintenance of rehabilitated areas (Domain 7) will consist of applications of fertiliser as well as weed and feral animal management over a five-year period after mine closure. Minor remedial earthworks or soil conservation works to address any erosion or sedimentation issues may also be undertaken over this period.

Monitoring programs, such as air, noise and water quality monitoring will be continued until decommissioning and rehabilitation procedures have been completed. The overall rehabilitation will be monitored for a period of at least five years after completion or when it can be demonstrated that the nominated completion criteria discussed in section 4 have been achieved. Monitoring will include visual inspections, tree density and percentage cover and transect studies, flora and fauna surveys and water quality monitoring of runoff waters. Water quality monitoring will be undertaken to verify the long-term salinity levels of any runoff waters. The proposed monitoring is described further in section 5 and within the RMP.

4. Mine closure completion criteria

In general terms, the Resources Regulator has established the following generic rehabilitation / closure criteria, and as such all mine sites must be rehabilitated according to the following criteria:

- rehabilitation and rehabilitation outcomes consistent with the environmental assessment which formed the basis of approval;
- based on mine closure criteria and rehabilitation outcomes developed through stakeholder consultation;
- integrates rehabilitated native vegetation with undisturbed native vegetation to provide consolidated areas and wildlife corridors where possible;
- suitable for an agreed subsequent land use as far as possible compatible with the surrounding land fabric and land use requirements;
- addresses limitations of land capability as a consequence of mining and rehabilitation;
- sustainable in terms of that land use;
- stable and permanent landforms, with soils, hydrology, and ecosystems with maintenance needs no greater than those of surrounding land (may include waste emplacements, voids, pits and water-bodies providing that they are part of the accepted final outcome);
- securely and safely contain waste substances that have the potential to affect land use or result in pollution;
- not present a hazard to persons, stock or native fauna;
- addresses identified threatened species issues;
- clean and tidy, and free of equipment/structures, except for heritage and other agreed features; and
- freedom from unacceptable air and water pollution, and other environmental effects outside the disturbed area.

Detailed completion criteria have been developed for rehabilitation. These criteria have been previously approved and are provided in the RMP.

5. Post-closure monitoring

The following sections outline the monitoring program currently implemented and provides direction on future programs that may be required during both decommissioning (i.e., between the cessation of mining and the closure of the mine) and the post-closure period. Statutory compliance, monitoring, and verification of environmental quality, including the protection of water resources, rank as the highest expectations to be met across the spectrum of community interests.

5.1 Current monitoring programs

NCOPL has an established monitoring program to monitor and report on environmental compliance across the ML. The following aspects are currently monitored:

- surface water - refer to the Water Management Plan (**WMP**);
- groundwater - refer to the WMP;
- biodiversity - refer to the Biodiversity Management Plan;
- subsidence - refer to the Extraction Plan and the appended subplans including the Land Management Plan and the Subsidence Monitoring Program; and
- rehabilitation - refer to the RMP.

5.2 Groundwater management post closure

NCOPL currently has a series of piezometers to monitor groundwater levels and quality, with current monitoring schedules outlined in the WMP. NCOPL records all water pumped into and out of the mine. Monitoring of groundwater alluvials will be undertaken for 5 years post mining and will also be tracked during operations with groundwater levels and groundwater model calibration. Brine reinjection levels will be recorded during closure and compared against groundwater levels and quality during the operational phase.

During consultation on the MCP in 2015, DPI Water recommended to include the requirements of the *NSW Aquifer Interference Policy* (DPI, 2012) (**AIP**) for post closure. Consideration of this is provided in section 5.2.1.

5.2.1 Impact Assessment

Hydrosimulations completed a groundwater assessment as part of MOD 5 in 2015. The AIP establishes minimal impact considerations for highly productive and less productive groundwater. From review of the DPI Water mapping of highly productive groundwater in the vicinity of the mine site, it is understood that the Namoi Alluvium and Southern Recharge Groundwater Source (**GAB**) are highly productive groundwater sources.

Section 5.2.3 of the MOD 5 Groundwater Assessment assessed potential impacts associated with brine reinjection post closure. The hydrographs confirm that the effects of reinjection are localised and confined essentially to the target layer 7 (Napperby Formation below the sill) and the overlying layer 6 (basalt sill) where pressures are expected to be artesian at the centre of the longwall panel, near artesian at the northern end of the panel, and sub-artesian at the southern end of the panel. Overlying layer 5 (Napperby Formation) and layer 4 (Garrawilla Volcanics) show no appreciable effect from the reinjection. This accords with the findings of the EA, at which time it was noted that the water level rise during reinjection did not reach the Garrawilla Volcanics (layer 4).

The EA also conducted particle tracking to show that no upward migration of saline water would occur from the injection site to the GAB aquifers and that lateral outflow of saline water would be confined to a distance of 1-2 km after 100 years.

Section 6 of the MOD 5 Groundwater Assessment stated:

- potential impacts on the highly productive Upper and Lower Namoi Groundwater Sources Water Sharing Plan[3] and Water Sharing Plan for the NSW GAB Groundwater Sources would be within the Level 1 trigger of the Aquifer Interference Policy; and
- drawdown of one privately-owned bore in less productive groundwater sources is predicted. This bore would be managed according to the Narrabri Mine Water Management Plan.

5.3 Rehabilitation monitoring

Regular monitoring of the rehabilitated areas will be required during the initial vegetation establishment period and beyond to demonstrate whether the objectives of the rehabilitation strategy are being achieved and whether a sustainable, stable landform has been provided. Rehabilitation monitoring will be undertaken in accordance with section 7 of the RMP until such a time as the completion criteria have been achieved and rehabilitation is signed off as complete.

5.4 Decommissioning monitoring

Following closure, the current monitoring program will be maintained until all decommissioning and rehabilitation works at the mine site have been completed. At this point, the elements that related specifically to the mining operation will be reviewed and rationalised in consultation with the appropriate authorities, and in accordance with the Project Approval.

Notwithstanding the above, there may be the need to establish some additional monitoring sites depending on the nature of the decommissioning works, and in response to finding possible sources of pollutants that currently may not be known (i.e., hydrocarbon contamination). The type and location of this monitoring will be determined during post-closure decommissioning.

5.5 Contingency plan

A trigger action response plan (**TARP**) for rehabilitation and mine closure has been developed to identify the required management actions in the event that the mine closure performance criteria have not been met. Where necessary, mine closure procedures will be amended accordingly with the aim of continually improving mine closure standards. NCOPL will notify the Resource Regulator and other relevant stakeholders of any incident resulting in major impacts to mine closure.

The responses specified within the TARP have been based on the mine closure completion criteria and the current rehabilitation and mine closure monitoring program. The post-closure monitoring program will trigger response actions, as specified in the TARP to ensure that threats to rehabilitation and mine closure do not become unmanageable. The mine closure aspects of the TARP will be reviewed closer to the actual mine closure, and a copy of the TARP is provided as section 3 of the LSMP.

[3] This has been repealed on 30 June 2020 by the Water Sharing Plan for the Namoi Alluvial Groundwater Sources Order 2020.

6. Relinquishment of the mining lease

Following successful mine closure, ML 1609 will be relinquished in consultation with the Resources Regulator. The Resource Regulator must be assured that the site has been rehabilitated and that it complies with the ML conditions. It is anticipated that this will include the preparation of reports on the rehabilitation/environmental performance of the site based on the interpretation of monitoring data and comparison to targets and completion criteria that are established for the site.

NCOPL will be required to complete an *ESF2: Rehabilitation completion and notification of mine site closure* that must document rehabilitation implementation and outcomes and demonstrate that the requirements have been met. Once the application has been registered and checked, DPE will undertake an assessment which may include an inspection of the mine site by the Resources Regulator.

Subject to accepting that the mine rehabilitation and closure works are satisfactory to the Resource Regulator, the lease will be cancelled, and the outstanding security deposit bond returned. On some occasions, a small proportion of the bond may be retained to cover any ongoing or foreseeable maintenance requirements.

7. Proposed timing for mine closure

Attachment 3 provides the indicative timeframe for mine closure, including decommissioning and rehabilitation of the site. It is based on the Project Approval which has mine closure planned for 2031. It is anticipated that the activities associated with closure of the mine will extend to at least 2035. The progressive rehabilitation of the site will assist in minimising the total mine closure liability after the mine has ceased to generate income from coal production. It is possible that some of the management domains could be progressively relinquished; however, this will need to be done in consultation with the Resource Regulator.

Notwithstanding this, there are a number of key activities that cannot commence until after the completion of mining operations. These include:

- reprocessing of stockpile base material;
- dismantling and removal of the CHPP and associated infrastructure;
- dismantling and removal of the administration and pit top facilities;
- rehabilitation of haul roads and internal access roads;
- final capping of the brine dams; and
- sealing of the portal void and filling of the box cut.

The indicative mine closure schedule will be reviewed and amended if required during the pre-feasibility stage of mine closure planning.

8. Plan implementation

8.1 Roles and responsibilities

To ensure adequate implementation of this plan and the associated monitoring, the following responsibilities have been assigned to relevant NCOPL personnel (see Table 8.1). Further details on the various responsibilities are provided in Attachment 1. It is also noted that additional responsibilities are referred to within the Extraction Plan and the appended sub-plans.

Table 8-1 - Roles and responsibilities

Roles	Responsibilities
General Manager	• Responsible for the development and implementation of the mine closure strategy for Narrabri Coal.
Mine Manager	• Ensure the MCP is implemented and adhered to.
Environmental Superintendent	• Ensure that all environmental monitoring and reporting is undertaken in accordance with the relevant environmental management plans and various approval requirements, and is checked, processed and filed appropriately. • Liaise with stakeholders during proposed mine closure planning. • Authorise changes to this MCP.
Registered Mine Surveyor	• Ensure that all subsidence monitoring associate with this MCP is carried out to the accuracy required, within specified timeframes and are checked, processed and filed appropriately.

Though retaining the responsibilities identified above, these personnel may, at their discretion, delegate specific tasks to suitably qualified and experienced operational personnel or consultants.

8.2 Annual Review

In accordance with Schedule 6 Condition 6, NCOPL will review the performance of its subsidence monitoring program for the previous calendar year and report the relevant results within the Annual Review, to the satisfaction of the Secretary. The Annual Review will at minimum provide information regarding the effectiveness of the program.

Further, the Annual Review requires a number of items to be reviewed or assessed. In summary these are:

- monitoring results and complaints;
- non-compliances and incidents;
- compliance with performance measures;
- discrepancies between predicted and actual impacts; and
- measures to be implemented to improve environmental performance.

The Annual Review may also make recommendations for any additions, changes or improvements to the subsidence monitoring program.

The Annual Review will be made available on the WHC website.

8.3 Independent environmental audits

Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, NCOPL will commission and pay the full cost of an Independent Environmental Audit (**IEA**) of the operations at Narrabri Mine (Stages 1 and 2), to be conducted in accordance with the requirements under Schedule 6 Condition 7.

The audit team will be led by a suitably qualified auditor and the IEA will be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary.

8.4 Monitoring program review and evaluation

As required by Schedule 6 Condition 3 of the Project Approval, within three months of any of the following:

- completion of an independent environmental audit (as required by Schedule 6 Condition 7);
- submission of an Incident Report (as required by Schedule 6 Condition 4);
- submission of an Annual Review (as required by Schedule 6 Condition 6); and
- any modification to the conditions of the Project Approval (unless the conditions require otherwise),

NCOPL will the review, and if necessary, revise this Subsidence Monitoring Program. This is to ensure that the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the Narrabri Mine operations. The review history table in the front of this Program provides the details of each review.

Condition 3 of Schedule 6 further states that if the review determines that this Subsidence Monitoring Program requires revision, then this will be completed to the satisfaction of the Secretary.

9. References

ATC Williams (2020). *Narrabri Reject Emplacement Area Capping Assessment and Closure Design*. Prepared for Narrabri Coal Operations Pty Ltd.

Department of Environment & Climate Change (2008). *Managing Urban Stormwater: Soils and Construction, Volume 2C, Unsealed Roads*.

Department of Planning and Environment (unpublished). *Guidelines for the Preparation of Extraction Plans*.

Department of Primary Industries (2012). *NSW Aquifer Interference Policy*.

Ditton Geotechnical Services (2021) *Mine Subsidence Assessment for Pillar Reduction Panels CF201-CF205 (A-J) and Longwalls LW203 to LW205 at the Narrabri Underground Mine*. Prepared for Narrabri Coal Operations Pty Ltd. DGS Report No. NAR-004/8. Prepared for Narrabri Coal Operations Pty Ltd.

Landcom (2004) *Managing Urban Stormwater - Soils and Construction: Volume 1*.

NSW Resources Regulator (2021). *Guidelines: Rehabilitation cost estimate*

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

Resource Strategies (2015) *Narrabri Mine Modification 5 Environmental Assessment*. Prepared for Narrabri Coal Operations Pty Ltd

Resource Strategies (2021) *Narrabri Mine Modification 7 - Environmental Assessment.* Prepared for Narrabri Coal Operations Pty Ltd

RW Corkery & Co. Pty Ltd (November 2009) *Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project*, Project Application No:MP08_0144. Prepared for Narrabri Coal Operations Pty Ltd

SLR (2019). *Narrabri Coal Mine - Revised Conceptual Mine Closure Plan for Stage 2 Longwall Operations*. Prepared for Narrabri Coal Operations Pty Ltd.

10. Glossary

Term	Definition
Compressive strain	A decrease in the distance between two points on the surface. This can cause shear cracking or steps at the surface if > 3 millimetres per metre (mm/m).
Environmental consequences	The environmental consequences of subsidence impacts including: damage to built features; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls; damage to Aboriginal heritage sites; impacts to aquatic ecology; ponding.
Extraction Plan Area	The surface area predicted to be affected by the proposed secondary extraction of Panels 201 to 202
Groundwater	Water contained in the interconnected pore spaces and voids of the saturated zone of sediments and rocks.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Material harm	Material harm to the environment is defined in section 147 of the POEO Act
Minimise	Implement all reasonable and feasible mitigation measures to reduce the impacts of the Narrabri Mine
MOD 5	Reduced the number of longwall panels from 26 to 20; increased the longwall panel widths for LW 107 to LW 120 from approximately 295 m to approximately 400 m; extended the western footprint approximately 60 m; and increased the maximum ROM coal processing rate from 8 Mtpa to 11 Mtpa.
MOD 7	Describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205
Panels 201 to 202	Pillar reduction panels CF 201 to CF 205
Project Approval	Development consent (DA_08_0144) issued on 26th July 2010 under Section 75J of the Environmental Planning and Assessment Act 1979 by the Department of Planning & Infrastructure (as modified).
Rehabilitation	The restoration of land disturbed by the development to ensure it is safe, stable and non-polluting over the short, medium and long term
Resources Regulator	NSW work health and safety regulator for mines, including underground mines.
Second workings	Extraction of coal from longwall panels, mini-wall panels, or pillar extraction.
Secretary	Planning Secretary under the EP&A Act, or nominee
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts.
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, including both vertical and horizontal displacement, tilt, strain and curvature.
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs.
Tensile strain	An increase in the distance between two points on the surface. This is likely to cause cracking at the surface if it exceeds 2 mm/m. Tensile strains are usually associated with convex (hogging) curvatures near the sides (or ends) of the panels.
Unacceptable risk	The level of risk at which mitigation actions are deemed to be warranted.

Attachment 1 Compliance conditions relevant to the MCP

Table A1.1 - Relevant Project Approval 08_0144 requirements

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
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.	Section 1.3
Schedule 2 Condition 11	With the approval of the Secretary, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis. ***Note**: The conditions of this approval require certain strategies, plans, and programs to be prepared for the project. They also require these documents to be reviewed and audited on a regular basis to ensure they remain effective. However, in some instances, it will not be necessary or practicable to prepare these documents for the whole project at any one time, particularly as these documents are intended to be dynamic and improved over time. Consequently, the documents may be prepared and implemented on a progressive basis, subject to the conditions of this approval. In doing this however, the Proponent will need to demonstrate that it has suitable documents in place to manage the existing operations of the project.*	There is no staging for the MCP for Panels 201-202
Schedule 5, Condition 5	The Mine Closure Plan must include:	
	a) define the objectives and criteria for mine closure;	Section 2.1 and Section4
	b) investigate options for the future use of the site;	Section 2.2
	c) provide a detailed methodology for decommissioning the site's evaporation/storage ponds and the treatment of any accumulated salt within or around those ponds;	Section 3.3, Table 3.2
	d) investigate ways to minimise the adverse socio-economic effects associated with mine closure;	Section 2.4
	e) describe the measures that would be implemented to minimise or manage the on-going environmental effects of the project	Section 3.5
	f) describe how the performance of these measures would be monitored over time.	Section 5
Schedule 6 Condition 3	Within 3 months of the submission of an:	
	a) audit under condition 7 of Schedule 6;	Section 8.4
	b) incident report under condition 4 of Schedule 6; and	
	c) annual review under condition 5 of Schedule 6; and	
	d) any modification to the conditions of this approval (unless the conditions require otherwise),	
	the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.	
Schedule 6 Condition 4	The Proponent shall notify the Secretary in writing via the Major Projects website and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.	Section 10.1

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
Schedule 6 Condition 7	Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project (Stages 1 and 2).	Section 8.2
Schedule 6 Condition 10	The Proponent shall: (a) make copies of the following publicly available on its website: • the documents referred to in Condition 2 of Schedule 2; • all current statutory approvals for the project; • all approved strategies, plans and programs required under the conditions of this approval; • a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs; • a complaints register, updated on a monthly basis; • minutes of CCC meetings; • the annual reviews of the project; • any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit; • any other matter required by the Secretary; and	Section 1.7
	(b) keep this information up-to-date, to the satisfaction of the Secretary.	Section 1.7

Attachment 2 Post closure final landform

771000 772000 773000 774000 775000 776000 777000 778000 779000 780000

6626000 6625000 6624000 6623000 6622000 6621000 6620000 6619000 6618000 6617000 6616000 6615000 6614000

EL 6243

EL 6243

LONGWALL 111
LONGWALL 110
LONGWALL 109
LONGWALL 108A
LONGWALL 107
LONGWALL 106
LONGWALL 105
LONGWALL 104
LONGWALL 103
LONGWALL 102
LONGWALL 101
LONGWALL 108B
LONGWALL 209
LONGWALL 208
LONGWALL 207
LONGWALL 206
LONGWALL 205
LONGWALL 204
LONGWALL 203
LONGWALL 202
LONGWALL 201

ML 1609

KAMILAROI HIGHWAY

KURRAJONG CREEK ROAD

MAYFIELD ROAD

EL 6243

LEGEND

Coal Titles
- ML 1609
- EL 6243
- Contour (5m)
- Watercourse
- Railway
- Road Corridor
- Mine Workings
- Limit of Subsidence to 20mm
- Aboriginal Heritage Sites

Land Capability
- Class III Land Capability

Indicative Secondary
- B - Water Management Area
- D - Rehabilitation Area - Pasture
- E - Rehabilitation Area - Woodland (Existing)
- F - Rehabilitation Area - State Forest (Existing)
- J - Conservation and Biodiversity Offset Area

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

Scale: 1:12,000
GDA 1994 MGA Zone 55

10-Aug-2020
630.12981

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Narrabri Mine
FINAL LANDFORM - 2036

FIGURE A2.1

Attachment 3 Indicative mine closure schedule

	Closure planning					Decommissioning and rehabilitation					Maintenance and monitoring			Relinquishment	
Years from closure	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10
Section 1															
Consult with stakeholders during detailed closure planning															
Agree detailed closure strategy with WHC corporate and regulatory authorities															
Develop detailed infrastructure decommission and demolition plan (qualified demolition expert required)															
Section 2															
Domain 1 - Infrastructure Area															
Demolition of the administration buildings, bath house, car park, associated storage sheds															
Removal of power lines, transformer facilities and associated infrastructure															
Removal of electricity sub-station and associated switch yard															
Demolition of maintenance workshop, service bays, vehicle wash down, laydown, bulk fuel storage tanks and infrastructure															
Coal load-out bin and associated infrastructure for loading the trains															
Decommission and remove the water pipeline to the Namoi River															
Coal crushing and sizing equipment															
Removal and rehabilitation of the coal stockpile areas															
Fill box-cut void and rehabilitate															
Seal mine portals (transport and ventilation) to industry standards / requirements															
Remove conveyors															
Domain 3 - Water Management															
Finalise cap and rehabilitation of the Brine Storage Dams (BR1 – BR5)															
Rehabilitate evaporation ponds for the evaporation of saline water from the underground workings															
Complete works of the water storage dams for the storage of on-site raw water															
Rehabilitate the surface water diversions															
Stabilise or rehabilitate the erosion and sediment control dams															
Decommission and dismantle the water conditioning plant (reverse osmosis)															
Remove the pumping and reticulation infrastructure															
Rehabilitate dams (where required)															
Domain 4 - Rejects Emplacement Area															
Finalise rehabilitation of the Rejects Emplacement Area															
Rehabilitate the all-weather unsealed access road															
Domain 5 - Stockpiled Material															
Strip stockpiled material and use for rehabilitation															
Domain 7 - Rehabilitation Areas															
Ongoing management and maintenance of rehabilitated areas															
Weed monitoring															
Domain 8 - Underground Mining Area															
Dismantle and seal the ventilation and gas drainage infrastructure to industry standards / requirements															
Rehabilitate access tracks															
Section 3															
Post Closure Activities															
Maintenance of disturbance areas															
Monitoring and inspections															