NARRABRI MINE

EXTRACTION PLAN

COAL RESOURCE RECOVERY PLAN

LW 203 – LW 206

Prepared by:

Title	Name	Signature	Date
Senior Environmental Consultant	Mike Gale		07 February 2023
Senior Environmental Manager	S. van der Meulen Onward Consulting		07 February 2023

Onward document number:
NCO-003-7-0-PLN

Acronyms and abbreviations

Acronym	Description
°	degrees
CF	Cut and flit
DGS	Ditton Geotechnical Services
DPE	NSW Department of Planning and Environment
EA	Environmental Assessment
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EP 203-206	Extraction Plan for LW 203 to LW 206
EP-CRRP	Extraction Plan - Coal Resource Recovery Plan (this document)
ha	hectare
km	kilometre
m	metre
ML	mining lease
mm	millimetre
mm/m	millimetre per metre
MPa	megapascal
Mt	million tonnes
Mtpa	million tonnes per annum
NCOPL	Narrabri Coal Operations Pty Ltd
NSW	New South Wales
ROM	run of mine
UCS	unconfined compressive strength
w/h; W/H	width to height ratios
WHC	Whitehaven Coal

Table of contents

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 Local Government Area in New South Wales (**NSW**). The Narrabri Mine includes an underground coal mine, a coal handling and preparation plant 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 commencing in 2010. Following the approval of the Stage 2 Environmental Assessment (R.W Corkery & Co., 2009) (the **EA**) and the issue of the Stage 2 Project Approval 08_0144 (**Project Approval**) in July 2010, and *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) 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 Cut and Flit (**CF**) 201 to CF 205. There is no change to the previously approved longwall panels LW 203 to LW 209. The bord and pillar mining will occur concurrently with existing longwall operations for a period of approximately five years, with the maximum ROM coal production rate remaining within the approved limit of 11 Mtpa.

1.2 Purpose and scope

As required by Project Approval Schedule 6 Condition 2, this Coal Resource Recovery Plan (**EP-CRRP**) as Appendix G to the Extraction Plan for LW 203 to LW 206 (**EP 203-206**) has been prepared in accordance with the NSW Department of Planning and Environment *Extraction Plan Guideline* (DPE 2022). It complies with Schedule 3 Condition 4(g) of the Project Approval, which states that as part of EP 203-206, a CRRP is to be prepared to the satisfaction of the NSW Resources Regulator that demonstrates the effective recovery of the available coal resource through underground mining activities.

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

In order to comply with the relevant statutory requirements outlined in the Project Approval, this EP-CRRP provides a description of the:

- coal resource available;
- proposed mining method, schedule and mine plan;
- resource recovery and effects on future mining; and
- justification for the proposed mine plan.

The LW 203 to LW 206 Extraction Plan Area[2] and underground mining layout is presented in Figure 1-1. A description of the underground mining method is provided in section 3.2.

[2] The area located within the 45° Angle of Draw as shown on Figure 1-1.

1.3 Objectives

The objective of this EP-CRRP is to detail the efficient and effective extraction of coal from longwall panels LW 203 to LW 206.

1.4 Statutory requirements

1.4.1 Project Approval

The EP-CRRP has been developed in accordance with Schedule 3 Condition 4 of the Project Approval which requires NCOPL to prepare an Extraction Plan for all second workings within the area of the Approved Mine Plan (Appendix H of EP 203-206) to the satisfaction of the Secretary.

In accordance with Schedule 3 Condition 4(g), the Extraction Plan must include an EP-CRRP that demonstrates effective recovery of the available resource.

Schedule 3 Condition 4(b) of the Project Approval requires the Extraction Plan and its sub plans to be approved by the Secretary prior to NCOPL carrying out any of the second workings covered by EP 203-206.

Project Approval Schedule 6 Condition 2 lists the requirements for the preparation of management plans which must be prepared in accordance with any relevant guidelines (section 1.2) and include details of the relevant approval, licence, or lease conditions. Attachment 1, Table A-1 provides a summary of the Project Approval conditions relevant to this Plan and outlines the section of the EP-CRRP in which each of these conditions have been addressed.

1.4.2 Mining lease

NCOPL are the holder of ML 1609 issued under the *Mining Act 1992* in January 2008. As the holder of a mining lease, NCOPL must take all reasonable measures to prevent, or if that is not reasonably practicable, to minimise, harm to the environment caused by activities under the mining lease.

1.4.3 EPBC Act approval

The Narrabri Mine is subject to EPBC 2009/5003 issued under the EPBC Act. There are no specific EPBC conditions related to this EP-CRRP.

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 Panels 201 to 202 and is presented as Appendix I to EP 203-206. The updated risk assessment for LW 203 to LW 206 identified one high-risk item (i.e. Mayfield GG1) above LW 205. All other risks within the Extraction Plan Area have been assessed as low to moderate.

1.6 Preparation and consultation

The development of this EP-CRRP does not require any specific individual consultation during preparation. However, in accordance with Schedule 3 Condition 4(g), NCOPL are required to prepare the EP-CRRP to the satisfaction of the Resources Regulator. NCOPL held a briefing session with the Resources Regulator on 2 December 2022 (Attachment 3 of EP 203-206). There were no specific actions required by the Resources Regulator to update the EP-CRRP following the briefing session.

The overall consultation and approval process required for the Extraction Plan by the Project Approval is detailed in EP 203-206.

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 EP-CRRP are uncontrolled.

2. Geological and geotechnical setting

2.1 Regional geology

As described in the EA, the Narrabri Mine is located within the Permo-Triassic Gunnedah Basin, which forms the central part of the north-south elongate Sydney-Gunnedah-Bowen Basin system. The Narrabri Mine is located near the north-western boundary of the Gunnedah Basin and the eastern margin of the Surat Basin, a sub-basin of the larger Great Artesian Basin. Hence, the rocks and sediments beneath and surrounding the mine can be grouped into:

- undifferentiated Quaternary sediments;
- Jurassic Surat Basin sequence; and
- the Gunnedah Basin sequence.

The Boggabri Ridge, comprising Early Permian volcanic rocks, forms the basement of the Gunnedah Basin and divides the basin into two parts, the Maules Creek sub-basin to the east, and the Mullaley sub-basin to the west.

The Narrabri Mine is located within the Mullaley sub-basin which contains Permian and Triassic sedimentary and volcanic rocks. The rocks strike approximately north-south and dip to the west at an angle of less than 10 degrees (°). In the area of ML 1609, adjacent to the Boggabri Ridge, there is a local angular unconformity between the Late Permian Black Jack Group and the overlying Triassic Digby Formation.

The western part of ML 1609 is overlain by Jurassic sedimentary and volcanic rocks along the eastern margin of the Oxley Embayment, a part of the Surat Basin.

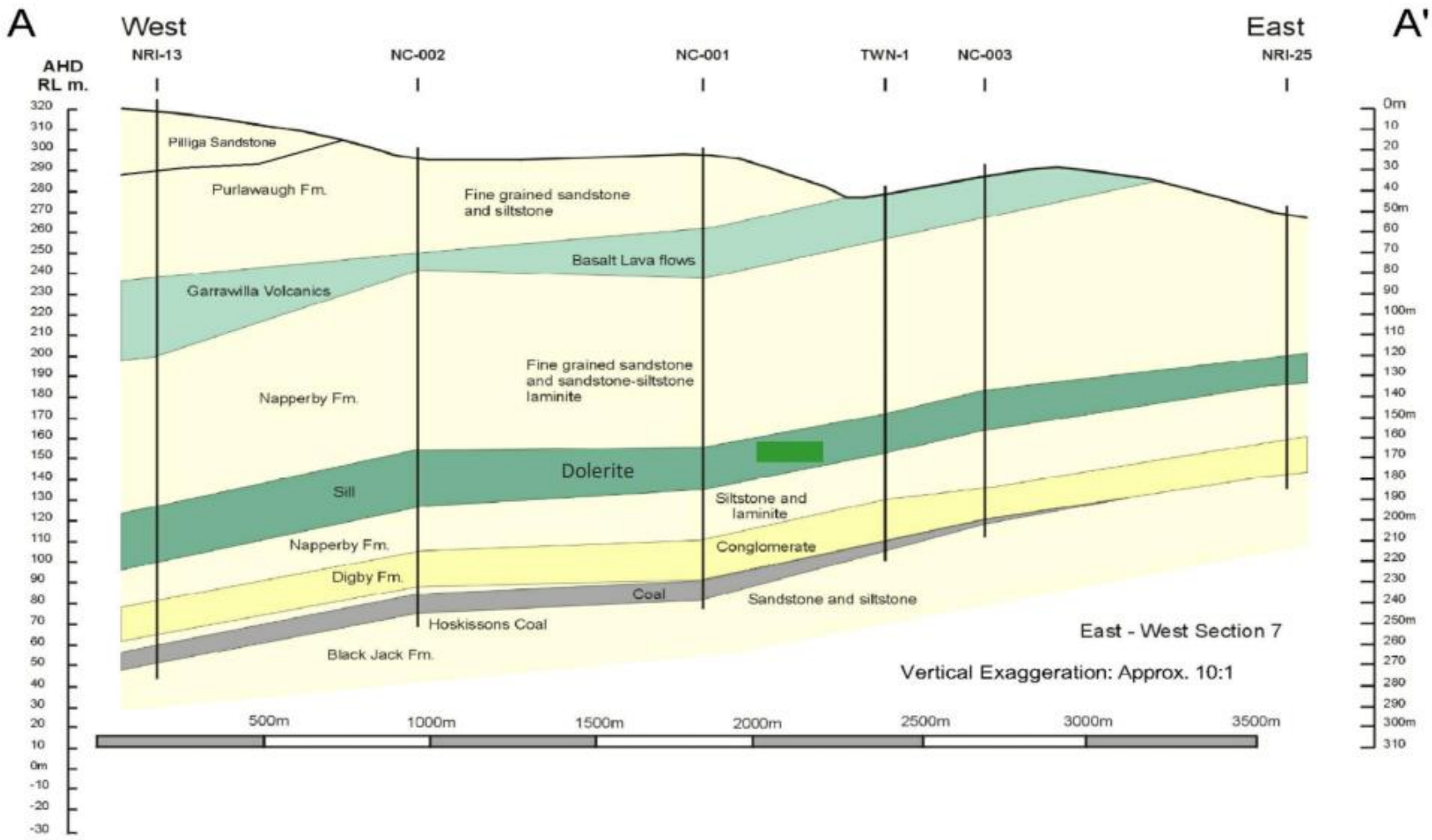
2.2 Local geology and stratigraphy

As described in the EA, the rocks throughout ML 1609 strike north-south and dip gently to the west. Minor variations to the north-south strike may be the result of variable thickness and compaction of the sedimentary units being draped over the faulted and uneven surface on the underlying Boggabri Volcanics. To the east of ML 1609, the Boggabri Volcanics have been uplifted and faulted along a north-south trending anticline structure, the Boggabri Ridge. The proximity of ML 1609 to the Boggabri Ridge is a major control on the outcrop and structure of the local geology.

The stratigraphic sequence at the Narrabri Mine is illustrated in a representative east-west cross section in Figure 2-1. Each unit in the sequence depicted is further described below.

Quaternary Sediments

Undifferentiated Quaternary alluvial gravel, sand silt and clay overly the Jurassic and Triassic rocks. Whilst not apparent in the cross-section depicted in Figure 2-1, these sediments are present in the east and northeast of the Narrabri Mine associated with the Namoi River, located to the east of the Narrabri Mine.



Source: Figure 3c (DGS 2022)

Figure 2-1 Typical section of lithology (east - west) across the Extraction Plan Area

Surat Basin (Great Artesian Basin) Sequence (Jurassic)

The Pilliga Sandstone crops out along the western margin of ML 1609. It is up to 60 metres (**m**) thick (DME Narrabri DDH-30) and consists of medium bedded, cross-bedded, well sorted, and fine to coarse grained quartz sandstone. The Purlawaugh Formation is up to 140 m thick and crops out over the western half of ML 1609. It consists of thinly bedded, generally fine grained, silty lithic sandstone, siltstone and minor claystone. Thin stony coal seams are present in the lower part of the unit.

The Garrawilla Volcanics unconformably overlie the Triassic Napperby Formation or the Deriah Formation where it is present. The volcanics consist mainly of alkali basalt flows with very minor intervening mudstone and clastic rocks. The Garrawilla Volcanics are up to 40 m thick.

Gunnedah Basin Sequence (Permian to Triassic)

The Napperby Formation is up to 140 m thick. It consists of a coarsening-up sequence of siltstone, sandstone/siltstone laminite, and fine to medium grained quartz-lithic sandstone. An intrusive dolerite sill is present in the lower part of the Napperby Formation in ML 1609. It varies in thickness from 0 to 30 m but is typically 15 to 20 m thick. It occurs approximately 30 to 35 m above the base of the Napperby Formation. It is dark green alkali basalt and is almost certainly related to the Garrawilla Volcanics. The basalt typically has strongly developed sub-vertical fractures infilled with secondary chlorite and zeolite minerals. The fractures do not continue into the enclosing rocks and may be related to cooling shrinkage.

The Digby Formation is divided into two units, the lower Digby Conglomerate and the overlying Ulinda Sandstone. The Ulinda Sandstone is either not present in ML 1609 or the boundary between these units is not clear with interbedded conglomerate and sandstone common in the top of the conglomerate. Consequently, the whole unit is referred to as the Digby Conglomerate in this area.

The Digby Conglomerate unconformably overlies the coal-bearing Black Jack Group. The unit consists mainly of thickly bedded, polymictic, lithic, pebble conglomerate with clasts of volcanic, meta-sediment and jasper in a lithic rich matrix. Minor finely to medium bedded, lithic sandstone beds are present towards the top of the unit. The Digby Formation is typically 15 to 20 m thick in ML 1609. The boundary with the underlying Black Jack Group is an angular unconformity. In the east of ML 1609, it cuts the Hoskissons Seam at a depth of approximately 130 to 160 m below the land surface. In the west, over a distance of approximately 5 km, there is up to 20 m of the Black Jack Group remaining above the Hoskissons Seam.

The Black Jack Group consists of lithic sandstone, siltstone, claystone and coal with minor tuff. It is up to 70 m thick in the western part of the ML 1609 but is less than 40 m thick in the east due to the low angle unconformity with the overlying Digby Formation. The Hoskissons Seam and the Melville Seam are present within ML 1609. Thickness and quality characteristics are such that only the Hoskissons Seam is currently considered to contain coal resources with mining potential.

Throughout ML 1609, the Black Jack Formation includes the following strata:

- Arkarula Formation - quartzose sandstone and siltstone. Typically, the upper 10 m of the Black Jack Formation;
- Brigalow Formation - coarse sandstone and conglomerate interbedded with the coal seam and grades laterally into the Arkarula Formation, thickening to the west across the Narrabri Mine from 2 to 19 m; and
- Pamboola Formation - lithic sandstone, siltstone, claystone and coal. Continuous over the Narrabri Mine below the Arkarula Formation and Brigalow Formation with a thickness of between 55 and 75 m.

2.2.1 Geological structure and geotechnical attributes

As noted previously, the major structural elements of the local geology are influenced by the proximity of the Boggabri Ridge. Regional aeromagnetic data indicates a strong north-west structure trend with northwest trending fault blocks in the basement. Exploration has identified one major fault in the northern area of the ML and two fault zones in the southern area of ML 1609. Each of these structures is oriented in a NW-SE direction and the northern structure decreases in magnitude towards the west. The geotechnical attributes of the various overlying units, the seam and seam floor are discussed in Table 2-1.

Table 2-1 Roof and floor strata features by geological unit

Unit	Description	Comments
Napperby Formation	Comprises mudstones, siltstones, sandstones and sandstone/siltstone laminites. Some units very weak, particularly along bedding planes and laminae.	This unit is not significant operationally. However, the drifts and ventilation shaft pass through the formation for the majority of their length. Excavation was relatively easy, however some sections required high density support and in these areas the depth of cut before supporting was restricted. This unit is expected to behave favourably in relation to longwall mining.
Dolerite sill	Basalt sill 40 to 60 m above the coal seam which is very strong.	Operational impact is expected to be slight due to the amount of interburden together with its fractured nature.
Digby Formation	Weakly cemented conglomerate with high matrix to pebble ratio. Strength tests indicate moderate strength.	Operational impact is not expected to be as severe as other NSW conglomerates, but the unit would behave massively, possibly more like a massive sandstone. Consequently, difficulty in achieving first cave and periodic weighting is anticipated. Stress tests indicate it is highly stressed relative to strength which should help the unit to cave following mining.
Benelabri Formation	These sandstone, sandstone/siltstone layers are not always present. They increase in thickness towards the west, separating the coal from the conglomerate. Moderate strength.	As significant thickness of roof coal is to be carried, these layers are not of great importance in terms of roof behaviour. However, by increasing the separation between the working section and the base of the conglomerate at the face start positions in the west, they would positively influence the potential for windblasts.
Roof coal	Generally, greater than 1m of clean coal in immediate roof.	The roof coal is expected to form a good roof on development with low stress as a result of shielding by the overlying conglomerate, such that roof support densities on development would be towards the lower end of those commonly found in other coal regions. Higher levels of secondary support may be required on retreat as a result of the altered stress field.
Working section	Not heavily cleated. Extent of jointing not known.	Refer to section 3.4 and the Mine Subsidence Assessment Report provided as Appendix J to EP 203-206 for assessments of stability of underground workings.
Arkarula / Brigalow Formation	Tests indicate moderate strength floor with no slaking tendency.	Floor problems are not anticipated.

3. Mining system and resource recovery

3.1 Coal resource

The coal resource at the Narrabri Mine consists of the Hoskissons Seam, which strikes generally north-south and dips gently to the west and ranges from 4.5 to 9.5 m thickness across the Extraction Plan Area. In the eastern half of ML 1609, the seam is cut off at a depth of approximately 160 m by a low angle unconformity between the coal seam and the overlying Digby Formation. The lower portion of the seam contains low-ash coal suitable for thermal applications, whilst the upper section contains high-ash stony coal and tuffaceous claystone bands that will remain in the roof where the seam thickness exceeds 4.3 m (the target mining height).

3.2 Mine design and geometry

The approved LW 203 to LW 206 are located south of the existing underground main headings. The four longwall panels will be between 2.89 km to 3.63 km long and extracted from south to north. The panel extraction sequence will occur from east to west. The cover depths over the proposed longwall panels will range from 185 m to 330 m, with void widths[3] ranging from 395.3 m to 402.8 m.

Three heading gate-roads are planned to be formed between LW 203 and LW 206 with two rows of diamond-shaped chain pillars with an acute rib-rib angle of 70°. The pillars will have minimum 'solid' widths ranging from 29.4 m to 39.5 m with lengths of 144.3 m. The distance between the pillar reduction panels to the east of the proposed longwall panels will be 266 m where the cover depth is 200 m. Gate roads will be approximately 3.7 m high and 5.4 m wide. Main headings roadways will be approximately 5.4 m or 6.0 m, wide depending on operational requirements.

The proposed chain pillar geometries[4] will be squat with width to height ratios (**w/h**) ranging from 7.9 to 10.7. The W/H at the centre of the panels would range from 1.27 to 2.01 based on cover depths at the centre of the panels. This indicates supercritical subsidence behaviour will occur above each panel. The end-of-panel barriers for LW 203 to LW 206 will be effectively 159 m at the starting ends and range from 103 m to 770 m wide at the finishing ends. The barriers are designed to protect the main headings from abutment loading conditions adjacent to the longwall goaf. The finishing end barriers for LW 203 to LW 205 are significantly wider than LW 206 due to geological structure.

A summary of the longwall panel geometry is provided in Table 3-1.

Table 3-1 Proposed longwall panel dimensions

Panel / sub-panel	Depth of cover (range) (m)	Gate roads (nominal) (m)	Main gate pillar width rib to rib (m)	LW void width (m)	LW length (m)
203	185 - 215	5.4	23.7 & 34.9	402.8	2,891
204	210 - 265	5.4	32.6 & 32.2	402.8	3,230
205	235 - 300	5.4	38.0 & 41.0	399.7	3,230
206	260 - 330	5.4	37.0 & 37.2	395.3	3,631

[3] Width is inclusive of the nominal gate road width of 5.4 m.

[4] Pillar geometries are expressed as lower case 'w' for width and 'h' for height, whereas upper case 'W' and 'H' refer to panel void width and cover depth.

Coal will be transferred via a conveyor system to the Pit Bottom Area for transfer to the surface via the drift conveyor.

Appendix H to EP 203-206 in the form of Plans 1 to 7 provides supporting information regarding details of coal resource, geological data, existing and proposed workings, potentially impacted surface features and subsidence monitoring.

3.3 Schedule

NCOPL's underground mining operations and associated surface support activities will be conducted seven days a week, 24 hours a day on a rotating shift basis. Surface operations not required specifically for underground mining (e.g. administration) operate during standard business hours. The headings of the mains are developed by the continuous miners at a potential rate of approximately 120 m per week, with the gate road headings developed at a rate of approximately 240 m to 280 m per week.

Secondary extraction under EP 203-206 is scheduled to commence in April 2023. Anticipated start and completion dates are summarised in Table 3-2, dependent on relevant mining constraints and status of subordinate approvals. The maximum annual mining rate will not exceed 11 Mtpa.

Table 3-2 Proposed mining schedule (secondary extraction)

LW	Estimated starting date	Approx. duration (months)	Estimated completion date
203	April 2023	14	May 2024
204	July 2024	13	July 2025
205	September 2025	11	July 2026
206	July 2026	10	May 2027

3.4 Stability of underground workings

The proposed longwalls will extract the lower 4.3 m of the 4.5 to 9.5 m thick Hoskissons Seam. The seam sub-crops to the east at approximately 130 m AHD. The seam comprises low to moderate strength coal with an unconfined compressive strength (**UCS**) range of 20 to 40 megapascals (**MPa**) and minor carbonaceous siltstone/mudstone bands.

The immediate roof of the proposed development roads will consist of 0.2 m to 5.2 m of upper Hoskissons Seam coal, which has similar strength coal but a higher proportion of low strength carbonaceous siltstone/mudstone (35% to 40% of roof section thickness) than the lower Hoskissons Seam coal. The Hoskisson's Seam is overlain initially by siltstone and sandstone laminite with minor mudstone with a UCS range of 33 to 36 MPa. The conglomerate of the Digby Formation is greater than 30 m or so above the seam within the Extraction Plan Area and has a UCS range from 21 to 42 MPa.

The floor of the development roadways will consist of moderate strength, carbonaceous siltstone/mudstone and sandstone with a UCS range from 30 to 45 MPa and low slaking potential.

The immediate roof and floor strata conditions are within the range of the empirical database cases and may therefore be used to estimate the chain pillar subsidence reliably for the Extraction Plan Area. However, in

regard to the mining height of 4.3 m, it is possible in small areas that the coal roof could prematurely cave ahead of the longwall shield supports, resulting in an effective increase in mining height (and subsidence).

As the mine progresses, updated reports will be commissioned to meet the mining geological conditions.

3.5 Future mining

Following completion of LW 203 to LW 206, extraction will progress to LW 207, with subsequent longwalls being mined in sequential numerical order. It is intended that longwalls will be extracted sequentially along the southern side of the main headings working outbye.

Subsequent Extraction Plans will be prepared for groups of longwall panels based on mine forecasting information that will become available in the future as operations progress.

3.6 Resource recovery

The mining layout has been optimised to achieve maximum resource recovery within the ML 1609 boundary, based on the geological constraints discovered to date, and any surface feature constraints. The expected resource recovery from LW 203 to LW 206 is detailed in Table 3-3.

Table 3-3 Reserves and resource recovery

Longwalls	In-situ reserves (incl. roof coal)	Recovered coal	Recovery
	Tonnes	Tonnes	%
203	10,716,248	6,701,770	63
204	15,278,856	7,511,364	49
205	16,300,225	7,559,197	46
206	18,032,018	6,974,312	39

As a result of proposed mining, there will be some subsidence impacts on the overlying strata. The overlying strata contain no currently identified viable coal seams within the geographical and depositional constraints of the deposit. Within the Hoskissons Seam, the top 4 m of the seam generally contain bedded tuffaceous bands that significantly reduce the quality of this upper resource. The proposed mining layout provides for the best resource recovery utilising proven conventional mining techniques. However, it is noted that the operation will not recover the lower quality roof coal within the Hoskissons Seam.

3.7 Justification

The mine plan (refer to Plan 1 in Appendix H of EP 203-206) has been developed based on extensive drilling, groundwater modelling, environmental investigation and assessment, and consultation with relevant authorities, as described in the EA, MOD 5 and MOD 7. Longwall boundaries are primarily constrained by the geology and characteristics of the Hoskissons Seam, and the mine plan has been developed to maximise resource recovery and allow for a high production mining operation.

The Subsidence Monitoring Program provided as Appendix K to EP 203-206 summarises the overall monitoring of mining impacts on the natural and built features, with proposed monitoring and management of subsidence impacts associated with secondary extraction detailed in the key sub plans. Surface features within the Extraction Plan Area are detailed on Plan 2 in Appendix H of EP 203-206. Further detailed information regarding Narrabri Mine operations is provided in the EA, MOD 5 and MOD 7.

4. Evaluation and review

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 EP-CRRP. 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.

Condition 3 of Schedule 6 further states that if the review determines that this EP-CRRP requires revision, then this will be completed to the satisfaction of the Secretary. A dedicated review register will be maintained which will provide the details of the review of all relevant strategies, plans and programs that need to be reviewed as required by Schedule 6 Condition 3 of the Project Approval. The revision status of this EP-CRRP is indicated in section 7.

5. References

Department of Planning and Environment (October 2022). *Extraction Plan Guideline.*

Ditton Geotechnical Services (2022) *Mine Subsidence Assessment for Longwalls LW203 to LW206 at the Narrabri Underground Mine*. Prepared for Narrabri Coal Operations Pty Ltd.

NSW Department of Planning, Industry and Environment (November 2021). *Project Approval Narrabri Coal Project – Stage 2*

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. Limited. (2009). *Environmental Assessment for the Narrabri Coal Mine Stage 2 Longwall Project*. Prepared for Narrabri Coal Operations Pty Ltd.

6. Glossary

Term	Definition
Angle of Draw	The angle with the vertical, made by a straight line extending away from the limits of extraction at seam level to the ground surface, spanning the horizontal distance in which subsidence may occur.
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**).
Cover depth	The depth of coal seam from the ground surface (metres).
Department	Planning and Assessment Group within the NSW Department of Planning and Environment (DPE).
Development	The Stage 2 development described in the EA as modified by the Project Approval.
Environmental consequences	The environmental consequences of subsidence impacts including: damage to built features; loss of surface flows to the sub-surface; 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 longwall panels LW 203 to LW 206.
First workings	Development of the main headings and gate roads to establish access to the coal in the mining area.
Goaf	The mined-out area into which the immediate roof strata breaks.
Material harm	Material harm to the environment is defined in section 147 of the POEO Act.
Mining operations	The extraction, processing and transportation of coal on the site, including the formation of mine access drifts and associated surface infrastructure such as gas and water drainage facilities.
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.
Narrabri Mine	The development approved under the Project Approval 05_0102 and Project Approval 08_0144.
Project Approval	Development consent (PA 08_0144) issued on 26th July 2010 under Section 75J of the Environmental Planning and Assessment Act 1979 by the Department of Planning and Infrastructure (as modified).
Rehabilitation	The treatment or management of land disturbed by the project for the purpose of establishing a safe, stable and non-polluting environment including the remediation of impacts.
Second workings	Extraction of coal from longwall panels, mini-wall panels, or pillar extraction.
Secretary	Planning Secretary under the EP&A Act, or nominee
Stage 1	The project approval granted by the Minister Planning for the Narrabri Coal Project, dated 14 November 2007.
Stage 2	Narrabri Mine Stage 2 approved under Project Approval 08_0144.
Statement of Commitments	The Proponent's revised commitments in Appendix 3 of the Project Approval, dated May 2010.
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts.

Term	Definition
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, such as 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.
the Proponent	Narrabri Coal Operations Pty Ltd
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	Vertical downward movements of the ground surface caused by underground coal mining.
Valley closure	The inward (or outward) movement of valley ridge crests due to subsidence trough deformations or changes to horizontal stress fields associated with longwall mining. Measured movements have ranged between 10 millimetres (**mm**) and 400 mm in the NSW Coalfields and are usually visually imperceptible.
Valley uplift	The phenomenon of upward movements along the valley floors due to Valley Closure and buckling of sedimentary rock units. Measured movements have ranged between 10 mm and 400 mm in the NSW Coalfields and may cause surface cracking in exposed bedrock on the floor of the valley (or gorge).
Vertical subsidence	Vertical downward movements of the ground surface caused by underground coal mining.
Watercourse	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 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.

7. Review history

Table 7-1 provides the EP-CRRP document review history.

Table 7-1 Document review history

Revision	Comments	Author	Authorised by	Date

Attachment 1 Compliance conditions relevant to this plan

Table A-1 Project Approval conditions relevant to this Plan

Condition	Requirement	Document reference
Schedule 3, Condition 4 (g)	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 include a: a **Coal Resource Recovery Plan** that demonstrates effective recovery of the available resource;	Section 1.4.1 Section 3
	Notes: *Management plans prepared under condition 4(h) should address all potential impacts of proposed underground coal extraction on the relevant features. Other similar management plans required under this approval (eg under conditions 13 and 23 of schedule 4 or condition 3 of schedule 5) are not required to duplicate these plans or to otherwise address the impacts associated with underground coal extraction.*	
Schedule 6 Condition 3	Within 3 months of the submission of an:	Section 4
	(a) audit under condition 7 of Schedule 6;	
	(a) incident report under condition 4 of Schedule 6; and	
	(b) annual review under condition 5 of Schedule 6; and	
	(c) 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 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