NARRABRI MINE

PUBLIC SAFETY MANAGEMENT PLAN

LW 203 – LW 206

Prepared by:

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Onward document number:
NCO-003-8-0-PLN

Acronyms and abbreviations

Acronym	Description
º	degrees
CF	Cut and flit
DGS	Ditton Geotechnical Services
DPE	NSW Department of Planning and Environment
EP 203-206	Extraction Plan for LW 203 to LW 206
EP-BFMP	Extraction Plan - Built Features Management Plan
EP-PSMP	Extraction Plan - Public Safety Management Plan (this document)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FCNSW	Forestry Corporation of NSW
FFD	far-field displacements
ha	hectare
HSE	health, safety and environment
IEA	Independent Environmental Audit
km	kilometre
LW	longwall panel
m	metre
ML	mining lease; megalitre
mm	millimetre
mm/m	millimetre per metre
MOD 5	Modification 5
MOD 7	Modification 7
Mtpa	million tonnes per annum
NCOPL	Narrabri Coal Operations Pty Ltd
PED	personal emergency device (communications system)
ROM	run of mine
U95%CL	upper 95 % confidence level
WHC	Whitehaven Coal Limited
XL	Cross section cross-line across the longwall panels

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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 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

This Extraction Plan – Public Safety Management Plan (**EP-PSMP** or **Plan**) for LW 203 to LW 206 has been prepared in accordance with Schedule 3 Condition 4(g) of the Project Approval and the NSW Department of Planning and Environment (**DPE**) *Draft Extraction Plan Guideline* (DPE 2022).

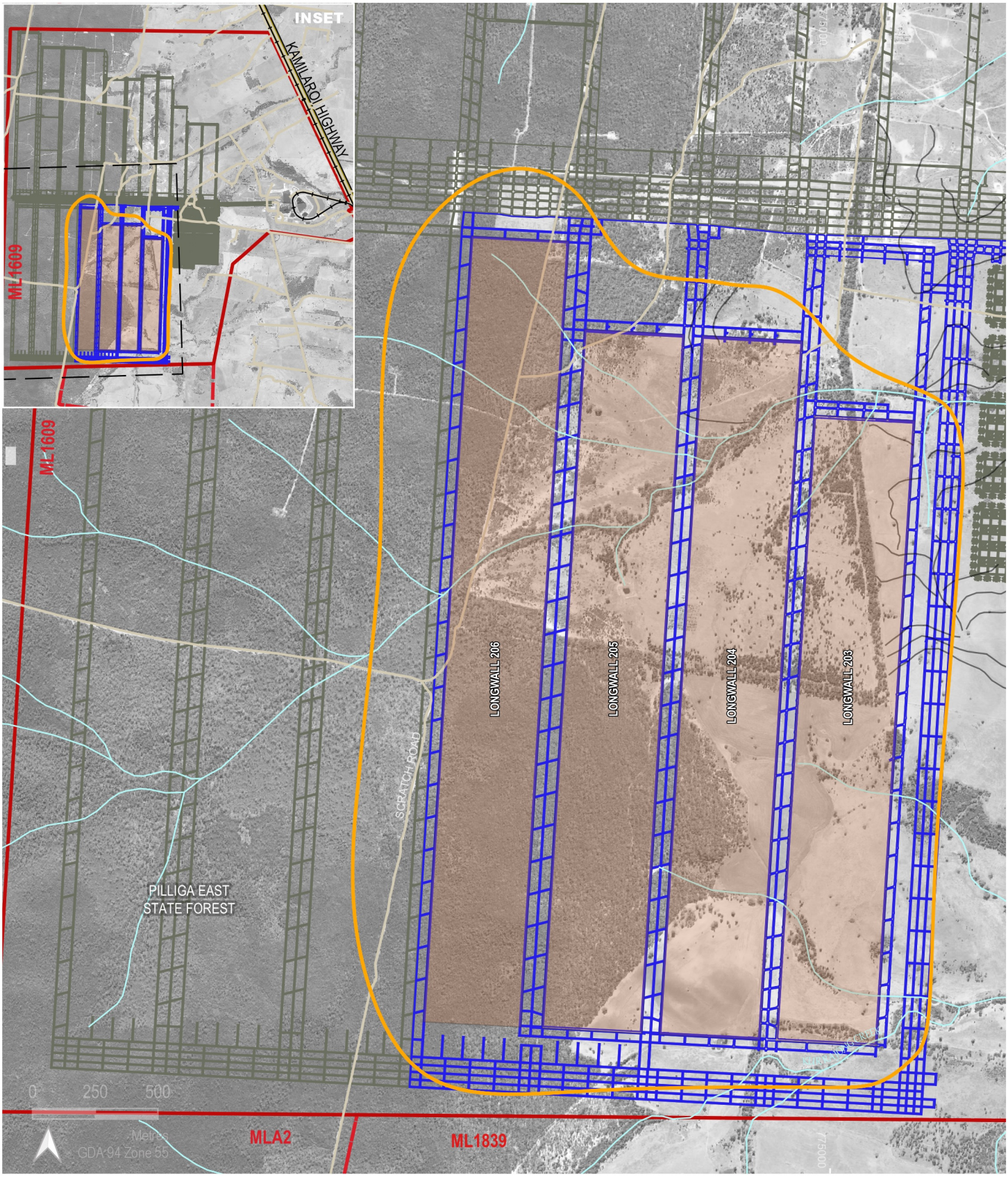
The EP-PSMP sets out the objectives, performance measures and management actions required to manage the potential impacts from subsidence on public safety above LW 203 to LW 206 (herein referred to as the **Extraction Plan Area**[2]). This Plan forms Appendix F of the Extraction Plan for LW 203 to LW 206 (**EP 203-206**).

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

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

The Ditton Geotechnical Services Pty Ltd (**DGS**) *Mine Subsidence Assessment Report for LW 203 to LW 206* (DGS 2022) (**Mine Subsidence Assessment Report**) has been used as a basis for developing the performance measures and management actions in response to the predicted subsidence impacts within the Extraction Plan Area. The Mine Subsidence Assessment Report is presented in full as Appendix J to EP 203-206.

The Extraction Plan Area and underground mining layout is presented in Figure 1-1. A detailed description of the underground mining method is provided within EP 203-206.



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LEGEND

- ML1609
- ML1839
- MLA2
- Underground mining layout
- Longwalls 203 to 206
- Proposed longwall voids (LW203-206)
- 45 degree angle of draw
- Road
- Watercourse
- Contour bank

NARRABRI MINE

FIGURE 1-1

Extraction Plan Area and Underground Mining Layout for LW 203 to LW 206

1.3 Objectives

The objectives of this EP-PSMP are to:

- provide detail of the relevant statutory requirements, including any relevant approval, licence or lease conditions;
- provide a description of the management of potential impacts and/or environmental consequences on public safety, with a specific focus on ensuring public safety and managing access to the site;
- provide a monitoring program that:
  - monitors for potential impacts to public safety as a result of subsidence;
  - identify impacts or exceedances that require additional management or response; and
  - evaluates the effectiveness of the management actions.
- provide triggers to inform additional and/or adaptive management actions;
- describe the protocol for managing and reporting any incident, non-compliance or exceedance of any impact assessment criteria or performance criteria, complaint, or failure to comply with other statutory requirements;
- detail the regulatory reporting requirements;
- describe the protocol for periodic review of this Plan; and
- identify the roles and responsibilities for implementation of this Plan.

1.4 Statutory Requirements

1.4.1 Relevant legislation

Work health and safety

This EP-PSMP has been developed to comply with the NSW work health and safety legislation including the:

- *Work Health and Safety Act 2011*;
- Work Health and Safety Regulation 2017;
- *Work Health and Safety (Mines and Petroleum Sites) Act 2013*; and
- Work Health and Safety (Mines and Petroleum Sites) Regulation 2022.

Under the Work Health and Safety (Mines and Petroleum Sites) Regulation 2022 (**Mines and Petroleum Sites Regulation)**, clause 70 states that NCOPL must manage risks to health and safety associated with subsidence at the mine and ensure that:

- as far as reasonably practicable, the rate, method, layout, schedule and sequence of mining operations do not put the health and safety of a person at risk from subsidence;
- monitoring of subsidence is conducted, including monitoring of its effects on relevant surface and subsurface features;
- an investigation of subsidence and an interpretation of subsidence information is carried out only by a competent person;
- all subsidence monitoring data is provided to the regulator:
  - in the approved way and form;

- at the times required by the regulator; and

- as far as reasonably practicable, procedures are implemented for the effective consultation, co-operation and co-ordination of action in relation to subsidence between the mine operator and relevant persons conducting business or an undertaking that is, or is likely to be, affected by subsidence.

Under the Mines and Petroleum Sites Regulation, clause 35 states that NCOPL must ensure that a high-risk activity identified under Schedule 3 is not carried out at or in relation to the mine or petroleum site unless:

- NCOPL has given notice of the activity to the regulator;
- the waiting period specified in Schedule 3 in relation to the activity has lapsed, subject to a waiver or reduction of the period under subsection (6), or an extension of the period under subsection (9);
- the activity is carried out in the way specified in the notice, or in the notice as amended under subsection (8).

Under Schedule 3 Part 3 Clause 17 of the Mines and Petroleum Sites Regulation, components of the Extraction Plan will be submitted to the Resources Regulator as part of the high-risk activity notification scheme. Notification for high risk activities must be in accordance with Division 3 Subdivision 1 Clause 35.

1.4.2 Project Approval

This Plan 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 to EP 203-206) to the satisfaction of the Planning Secretary.

In accordance with Schedule 3 Condition 4(g), the Extraction Plan must include a Public Safety Management Plan which has been prepared to the satisfaction of the Resources Regulator and which provides for the management of potential consequences of the proposed second workings on public safety.

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.

The EP-PSMP must include detailed performance indicators for each relevant performance measure conditioned under Schedule 3 Condition 2. In accordance with Schedule 3 Condition 2, NCOPL must ensure that the development does not cause any exceedances of the performance measures detailed in Table 1-1.

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 and include details of the relevant approval, licence or lease conditions. Attachment 1, Table A1-1 provides a summary of the Project Approval conditions relevant to this Plan and outlines the section of the EP-PSMP in which each of these conditions have been addressed.

Table 1-1 Subsidence impact performance measures – built features

Feature	Performance Measures
Built Features	
• All built features	• Always safe. • Serviceability should be maintained wherever practicable. • Loss of serviceability must be fully compensated. • Damage must be fully repairable and must be fully repaired or else replaced or fully compensated.
Public Safety	
• Public safety	• Negligible additional risk.

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-PSMP.

1.4.4 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.

1.5 Preparation and consultation

The development of this EP-PSMP does not require any specific consultation during preparation. However, in accordance with Schedule 3 Condition 4(g), NCOPL are required to prepare the EP-PSMP 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-PSMP following the briefing session.

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

1.6 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-PSMP are uncontrolled.

2. Risk assessment

A qualitative (level 2) subsidence risk assessment was conducted in October 2022 to identify 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 following sections detail the risk assessment method, control measures, risk rankings and implementation of the proposed control measures.

2.1 Method

The subsidence risk assessment followed a structured process to enable a critical and objective challenge of the subject to assist NCOPL to fulfil their obligation to protect the health and safety of persons on the surface and underground and prevent damage to infrastructure and natural features in accordance with the requirements of the NSW work health and safety legislation (section 1.4.1).

The participants in the risk assessment included the relevant NCOPL management team, technical personnel, and external specialists. It was undertaken in accordance with the WHC Risk Management Standard (WHC-PRO-HSE RISK MANAGEMENT), which is based on the requirements of Australian Standard *AS/NZS ISO 31000:2018 Risk Management – Guidelines,* MDG1010 - *Risk Management Handbook for the Mining Industry* (2011) and MDG1014 – *Guide to Reviewing a Risk Assessment of Mine Equipment and Operations* (1997).

The risk assessment considered the relevant limitations and exclusions, and subsidence predictions detailed in the Mine Subsidence Assessment Report.

2.2 Results

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.

2.3 Control measures

Risk control measures were identified based on the predicted subsidence effects and potential impacts to public safety. Control measures identified during the risk assessment workshop relevant to subsidence include:

- Monitoring of surface cracking and remediation;
- Demarcation of active subsidence areas;
- Erecting warning signs in active subsidence areas; and
- Authorised access only to mine owned land.

Control measures relevant to public safety are detailed in section 4, Attachment 2, and Attachment 3.

3. Subsidence predictions and environmental consequences

3.1 Subsidence predictions

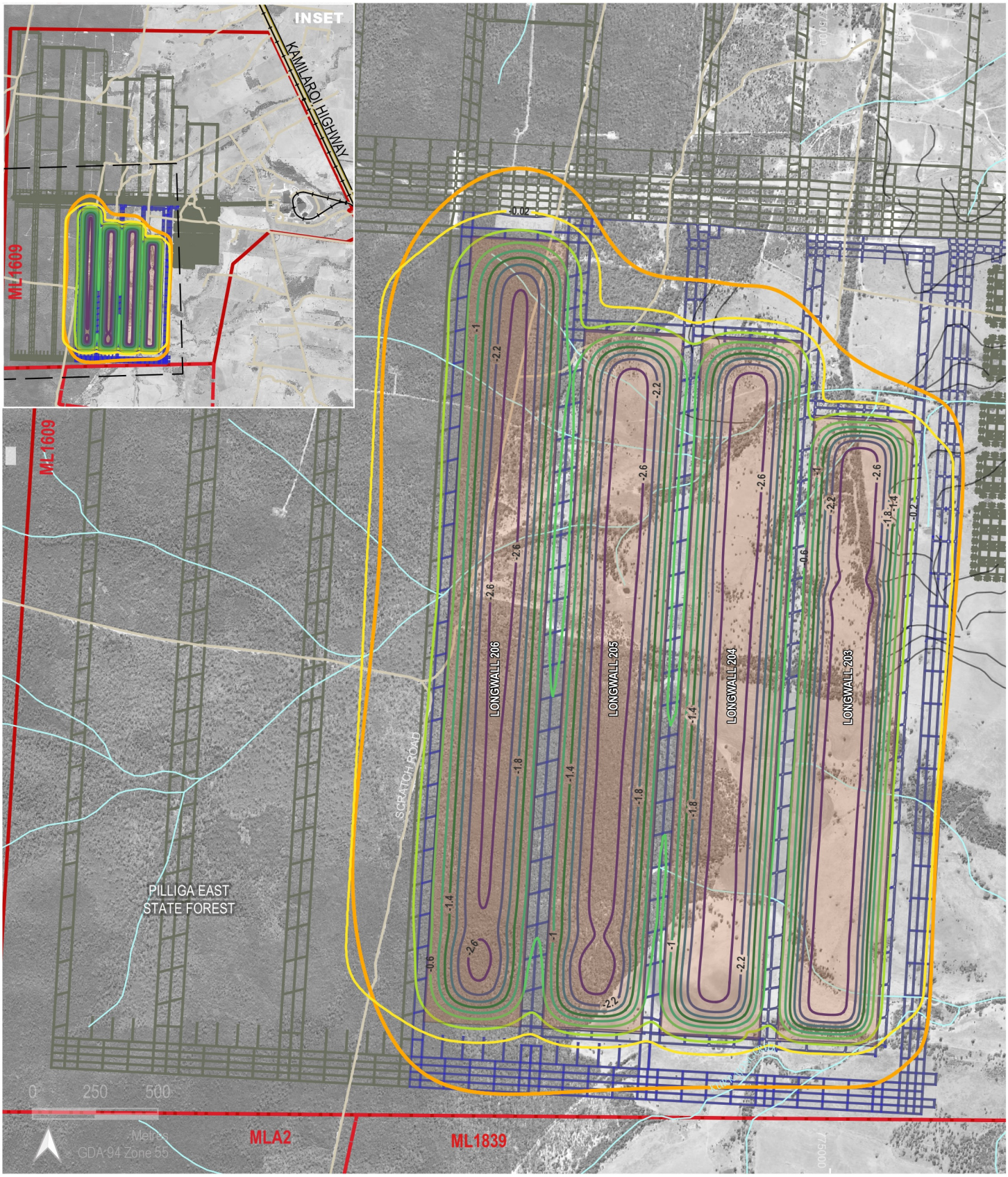
Subsidence predictions for the Extraction Plan Area were assessed and are presented in the Mine Subsidence Assessment Report. The Mine Subsidence Assessment Report details the potential impacts to natural, man-made and Aboriginal heritage features, including public safety, within the Extraction Plan Area based on the predictions of conventional and non-conventional subsidence. The predictions include a review of the subsidence effects measured above previously undermined LW 101 to LW 109.

The predicted maximum subsidence estimates for the Extraction Plan Area are summarised in Table 3-1 and shown on Figure 3-1.

Table 3-1 Maximum final subsidence effect predictions

LW	Cover depth (m)	Subsidence (m)	Tilt (mm/m)	Tensile strain (mm/m)	Compressive strain (mm/m)
203	200-208	2.63 - 2.80	34 - 55	15 - 32	16 - 35
204	230-242	2.72 - 2.80	29 - 47	11 - 26	12 - 27
205	248-282	2.75 - 2.80	24 - 39	9 - 19	9 - 21
206	280-311	2.75 - 2.80	20 - 33	7 - 15	7 - 16

Source: adapted from Table 4 (DGS 2022)



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Subsidence contours (m)

- -0.02
- -0.2
- -0.6
- -1
- -1.4
- -1.8
- -2.2
- -2.6

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FIGURE 3-1

Predicted Subsidence Contours
for LW 203 to LW 206

3.1.1 Surface cracking

Based on the predicted range of maximum transverse tensile strains for the proposed longwall panels (i.e. 7 mm/m to 32 mm/m), surface crack widths are estimated to range from approximately 210 mm to 330 mm in cohesionless soils and from approximately 420 mm to 650 mm in cohesive soils or shallow rock (Table 3-2). Cracks usually develop within several days after a longwall face has retreated beneath a given location, with some of the cracks closing in the compression zone in the middle of the fully developed subsidence trough, together with new cracks developing in the tensile zones along and inside the panel sides approximately two to three weeks later.

Surface crack widths are upper 95% confidence level (**U95%CL**) values (to the nearest 10 mm), which means they may be exceeded 5% of the time (by definition) due to adverse topographic or geological conditions. Whilst this effect is unlikely to occur within the Extraction Plan Area, crack widths may exceed the predicted range near the crests of steep creek banks or elevated ridges. The steep rocky slopes above LW 204 and LW 205 are considered likely to be impacted by surface cracking more than 300 mm wide. Based on the above, it is estimated that approximately 0.02 km^2 to 0.04 km^2 of the surface will be crack affected. This represents 0.13% to 0.27% of the extracted longwall area.

Based on reference to the Australian Coal Industry's Research Program (2003), surface cracks will likely develop by the time the longwall face has retreated past a given location for a distance equal to one to two times the cover depth (i.e. ranging from 170 m to 840 m, based on cover depths at the Narrabri Mine).

Detail on steep slopes and sub surface cracking relevant to the Extraction Plan Area is presented in the Extraction Plan – Land Management Plan.

Table 3-2 Predicted maximum crack width in flat terrain

LW	Cross section cross-line [XL]	Panel width [W] (m)	Cover depth [H] (m)	Panel W/H	Effective bay length* (m)	Predicted maximum tensile strain (mm/m)		Predicted U95%CL crack width (mm)	
						Mean	U95%	Sand or Loam	Clay or Rock
203	6	402.8	208	1.94	10.4	15	29	300	600
	7	402.8	200	2.01	10.0	15	31	310	620
	8	402.8	204	1.97	10.2	16	32	330	650
204	6	402.8	232	1.74	11.6	12	24	280	560
	7	402.8	242	1.66	12.1	11	23	280	560
	8	402.8	230	1.75	11.5	13	26	300	600
205	6	399.7	248	1.61	12.4	10	20	250	500
	7	399.7	282	1.42	14.1	9	17	240	480
	8	399.7	275	1.45	13.8	9	19	260	520
206	6	395.3	280	1.41	14.0	8	15	210	420
	7	395.3	311	1.27	15.6	7	14	220	440
	8	395.3	304	1.3	15.2	8	15	230	460

Source: Table 7 (DGS 2022)
* - max (H/20, 10m)

3.1.2 Ponding

The Mine Subsidence Assessment Report predicts a maximum panel subsidence of up to 2.8 m, which may result in closed form depressions forming in some of the central areas of the longwall panels with flatter surface gradients and disrupt natural drainage pathways to watercourses and farm dams. Analysis of the pre- and post-mining surface levels suggests that ponding (if it occurs) is likely to develop along Kurrajong Creek and its tributaries.

A total of six potential ponding locations have been assessed within the Extraction Plan Area. Five of the potential ponding areas already exist along the watercourses and dams. Existing (pre-mining) and post-mining pond depths are estimated to range from 0.1 m to 4.7 m. Pond depths are estimated to increase by up to 1.3 m or decrease by up to 0.04 m.

The maximum changes in pond area (where positive represents an increase in pond area) are estimated to range from -0.42 ha to 2.92 ha. The maximum changes in pond volume (where positive represents an increase in pond volume) are estimated to range from -0.23 megalitres (**ML**) to 20.6 ML[3]. The largest ponding increases are estimated over LW 203 and LW 205.

Overall, the existing ponds are expected to extend laterally from the watercourses for distances ranging from 50 m to 410 m. Existing ponded areas extend up to 270 m, indicating a potential lateral increase of up to 140 m.

3.1.3 Steep rocky slopes

The southwestern area of LW 204 and LW 205 is overlain by a broad ridge ‘hillocks’ with several steep rocky slopes (18° to 35°) and exposures of Pilliga Sandstone. The strata bedding generally dips towards the southwest to west at less than 5°.

By definition, there is one steep rocky slope (S12) within the Extraction Plan Area (Refer to Plan 2 Appendix H to EP 203-036) above LW 204 (Figures 2b/2c in Appendix J to EP 203-206).

In addition, there are steep to very steep incised slopes along the ephemeral watercourses along Kurrajong Creek Tributary 1. The slopes range between 1 m to 3.5 m high banks that extend for 20 m to 120 m.

Predicted subsidence effects will be caused by tilting, bending and cracking of the steep slopes and minor cliff faces. Crack widths on subsided slopes are likely to be larger than those that develop in relatively flat terrain due to rotation and strain effects.

Surface cracks on the steep slopes are likely to develop along the high rib-side of the longwall blocks and in the vicinity of the peak tensile strains. The tensile strain profile is likely to migrate towards the high side ribs and may occur outside the limits of extraction.

Compressive strain effects such as shear failures and local 'heaving' or uplift development may occur along the low rib-side of the longwalls or along creeks. Transient cracking across and behind the longwall face may occur periodically after each goaf fall in the workings.

[3] The actual ponding depths, areas and volumes will also depend upon several other factors, such as rain duration, surface cracking and effective percolation rates of the surface soils along the creeks/drainage lines.

Previous studies of crack width estimation above longwalls in relatively 'flat' to moderately sloping terrain in the Newcastle Coalfield have been reasonable based on the predicted strains multiplied by 10 m to 15 m (i.e. the typical distance between survey pegs and allowing for strain concentrations).

The measured crack widths in steep terrain (slopes > 18°) are also influenced by the tilting of slopes and ridges of a given height. The crack width estimate should consider both longwall face and rib-side cracking that occur during subsidence development. No tilt affect is assumed where slopes above the longwall are < 18°.

A summary of the predicted crack widths for the steep slopes within the Extraction Plan Area are presented in Table 3-3.

Table 3-3 Predicted crack widths on steep slopes

Feature no.	Slope height (m)	LW	Cover depth (m)	Maximum feature subsidence (m)	Maximum feature strain (mm/m)	Maximum feature tilt (mm/m)	Crack width from strain* (mm)	Crack width from tilt* (mm)	Crack width from tilt & strain* (mm)
S12	6 - 12	204	245 (SE)	2.8	-13 to 15 (30)	10 - 15	185 (370)	120 (240)	385 (770)

Source: Table 8C (DGS 2022)
S12 = Steep Rocky Slope No. 12.
* - crack widths assume a single crack may develop along the upslope rib side of the given longwall beneath steep slopes > 18º.
(brackets) - discontinuous strain due to cracking.

3.1.4 Far-field horizontal displacement and strain

Horizontal movements recorded beyond the 20 mm subsidence contour are referred to as far-field displacements (**FFDs**). An empirical model for predicting FFDs in the Southern Newcastle Coalfield indicates that measurable FFD movements (> 10 mm) generally occur for distances of two to four times the cover depth (2H to 4H). The direction of the movement is generally towards the extracted area but can vary due to the degree of regional horizontal stress adjustment around the extracted area and the surface topography. As a result, FFD impacts at the Pit Top Area and Namoi River are not anticipated.

Centreline and crossline horizontal strain data (normalised to cover depth) indicate strains are typically < 1 mm/m at an angle draw of 26.5° or 0.5 times cover depth.

As surface cracking is unlikely to develop at strains < 1 mm/m, it is considered that 0.5 times cover depth is the practical limit of surface impact for the Narrabri Mine. Far-field displacements and strains generally only have the potential to damage long, linear features such as pipelines, bridges, dam walls and railway lines.

3.2 Potential public safety hazards

Subsidence effects that may pose a potential public safety hazard include:

- surface cracking;
- ground deformations;
- damaged infrastructure (e.g., damaged roads); and
- loss of services.

Existing surface features within the Extraction Plan Area that are relevant to this EP-PSMP include:

- agricultural land predominately used for grazing cattle (one lessee associated with the 'Mayfield' property);
- steep rocky slopes up to 15 m high;
- one unsealed Forestry NSW access road (Scratch Road) above LW 205 and LW 206; and
- farm dams used for livestock watering.

Based on the low frequency of public exposure along the roads and access tracks, the risk to personal safety due to falls or vehicle accidents associated with steep slope cracking is likely to be 'very low'.
There are no other public facilities or amenities within or accessing the Extraction Plan Area.

The potentially affected surface features are shown on Plan 2 (Appendix H to EP 203-206). Potential subsidence impacts to built features, which are also relevant to this EP-PSMP, are detailed within the Extraction Plan – Built Features Management Plan (**EP-BFMP**).

4. Management measures

4.1 Performance measures and indicators

General performance measures for public safety are defined under Schedule 3 Condition 2 of the Project Approval and have previously been produced in Table 1-1. NCOPL will ensure that there is negligible additional risk to public safety.

Additional specific performance measures have been developed and are listed in Table 4-1. These performance measures align with the EP-PSMP objectives outlined in section 1.3.

Table 4-1 Public safety management objectives and performance measures

Objectives	Performance measure/indicator
No additional safety risk.	• No unmanaged risk to public safety as a result of mining operations. • All identified public safety risks are managed quickly and appropriately to avoid injury.
Prevent personal injury as a result of subsidence impacts.	• No injuries or accidents as a result of subsidence impacts or subsidence damage. • Safety incidents are recorded within the NCOPL occupational health and safety management system for appropriate follow up and corrective action.

4.2 Subsidence management and monitoring

In accordance with Schedule 2 Condition 1 of the Project Approval, NCOPL will implement all practicable measures to prevent and/or minimise any harm that may result from the construction, operation, or rehabilitation activities at the Narrabri Mine.

NCOPL will implement the management actions detailed in the following sections to ensure compliance with the performance measures listed in Table 1-1 and Table 4-1, and to manage or remediate any impacts and/or environmental consequences of the proposed second workings on land in general.

Subsidence monitoring will be conducted in accordance with the Subsidence Monitoring Program (Appendix K to EP 203-206).

4.2.1 Surface cracking

NCOPL will conduct remediation of surface cracking where crack width is more than 50 mm. A preliminary assessment will be undertaken to minimise the environmental impact of remediation actions. Prior to any remediation, NCOPL will undertake a review of environmental impacts and/or safety hazards that may result from the remediation at the specific location and consider whether remediation will create an increased impact (e.g. clearing native vegetation to enable machinery access or major drainage works that will cause a greater impact from excavation). If the assessment concludes that there may be the potential to increase impacts to the environment or public safety, alternative methods of remediating the crack are warranted (e.g. without machinery).

After surface cracks have been remediated, NCOPL will conduct an inspection within three months to identify if further remediation is required.

4.2.2 Ponding

The standard management measures for the remediation of subsidence induced ponding include:

- ponding located in areas where vegetation is not affected, will be allowed to self-correct;
- ponding located in areas with affected vegetation, or if ponding significantly alters or affects flows, will be assessed and remedial actions (that present the lowest environmental impact) developed in consultation with a geomorphologist; and
- if Endangered Ecological Communities are impacted, or downstream water quality analysis indicates a change in EC trends (refer to the Water Management Plan [Appendix A to EP 203-206]), the ponding will be assessed, and remediation options will be developed to afford the maximum practical protection to the affected feature.

Remediation of surface cracking and ponding is further detailed in the Land Management Plan (Appendix B to EP 203-206).

4.3 Management of public safety risks

Any publicly owned surface features such as bridges or culverts within five times the cover depth (e.g. 800 m from the proposed longwalls on the eastern side of the Extraction Plan Area) will be monitored for FFD movements during mining (i.e. Werris Creek Mungindi Railway and Kamilaroi Highway, with their associated infrastructure, are the only public utilities that exist to the east and are outside the five times cover depth range).

The deeper western side of the Extraction Plan Area may affect a larger area of up to 1.5 km away, however it there are no man-made infrastructure items within this range (except a water bore at 0.75 km away from LW206).

For each of the risks identified with respect to public safety, controls have been developed to ensure that the level of risk is eliminated or reduced. Surface infrastructure affected by subsidence that may pose a threat to public safety are summarised in Table 4-2. The majority of the management controls, monitoring requirements and contingency response relating to public safety are consistent with the EP-BFMP.

Table 4-2 Potential public safety risks, control measures and monitoring

Feature/aspect	Potential subsidence effect	Potential safety risk	Control measures	Monitoring
Land surface	• surface cracking • ground deformation • erosion • landslips	Personal injury: • trip/fall • vehicle hazard/accident • individual trees may become unstable • movement of land/falling rocks	• erect warning signs • road closure • temporary fencing • prevent unauthorised access to mine site • communicate with staff/contractors/Forestry Corporation of NSW (**FCNSW**) • visual inspections and repair of surface cracks, deformations and erosion	Subsidence monitoring in accordance with the Subsidence Monitoring Program (Appendix K to EP 203-206)
Access roads and tracks	• surface cracking and ground deformation • formation of compression humps and dips • changes to drainage patterns	Traffic hazard: • vehicle accident	• erect warning signs • road closure • communication with staff/contractors/FCNSW • visual inspections • implementation of additional traffic controls • remediate road surface damage temporarily during active subsidence to maintain traffic ability and permanently following active subsidence	Visual inspections in accordance with the EP-BFMP
Water storage dams	• cracking of dam walls • loss of storage capacity	Personal injury: • dam wall failure resulting in sudden release of water	• pre-mining assessment • visual inspections • draining (if required) and remediation works (e.g., reconstruct contour banks and repair cracking in and around dam wall)	Visual inspections in accordance with the EP-BFMP

Feature/aspect	Potential subsidence effect	Potential safety risk	Control measures	Monitoring
Buildings/machinery sheds	• release of potentially harmful substances (i.e., asbestos) • structural instability • interruption to services	Personal injury: • building collapse or uneven structure	• vacate dwelling and restrict access to buildings and surrounds prior to active subsidence • disconnect services to subsidence affected buildings • pump septic tanks • conduct hazardous materials identification surveys • retained structures to be confirmed structurally sound and fit for use	Assessments (pre and post mining) in accordance with the EP-BFMP
Fences and gates	• tilted fences • wire breakage • gates unable to open/close.	Traffic hazard: • livestock escape onto public roads (and potentially to Kamilaroi Highway to east)	• exclude stock from active subsidence area • visual inspections • install temporary fencing to control stock movements in event of existing fence damage • rectify impacts to fences/gates	Survey and visual inspection in accordance with the EP-BFMP
Unauthorised access to mine site	• all of the above	Personal injury: • trip/fall • vehicle hazard/accident • individual trees may become unstable • movement of land/falling rocks • dam wall failure resulting in sudden release of water • building collapse or uneven structure	• authorised mine personnel only • induction process • provide notification to staff and contractors of the potential for subsidence impacts to access tracks/roads, advising of potential hazards, and including relevant contact details for further information the reporting of potential issues. • written notification to forestry personnel of the potential for subsidence impacts to access tracks/roads, advising of potential hazards, and including relevant contact details for further information the reporting of potential issues.	Record of inductions kept

5. Contingency response

In the event that a non-compliance against a performance measure detailed in section 4.1 has occurred, or is likely to occur, NCOPL will:

1. Report the non-compliance as soon as practicable to the relevant agencies as required under the Project Approval in accordance with section 6.2.
2. Identify and implement an appropriate course of action with respect to the non-compliance in consultation with a suitably qualified person/s and relevant agencies.
3. Review the effectiveness of the EP-PSMP management measures in accordance with section 7.4.

A Trigger Action Response Plan (Attachment 2) has been developed to identify, assess, and respond to triggers and manage risks associated with meeting the public safety performance measures.

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 the Project Approval or any other statutory approval (e.g., the Environmental Protection License [**EPL**]).

In the event of any exceedance of the 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 NSW Environment Protection Authority will be made by contacting the Environment Line 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 NCOPLs Environmental Management Strategy.

6.2 Non-compliance notification

In accordance with Schedule 6 Condition 2, where a non-compliance with a statutory requirement/s 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[4]. 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.

[4] 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 under section 6.2.

7. Reporting, evaluation and review

7.1 Annual Review

In accordance with Schedule 6 Condition 6, NCOPL will review the performance of its environmental 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 public safety.

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 NCOPLs environmental management procedures.

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

7.2 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 development (Stages 1 and 2), to be conducted in accordance with the requirements of 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.

7.3 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 IEA (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 then review, and if necessary, revise this EP-PSMP. 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-PSMP 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-PSMP is indicated in section 12.

7.4 Improvement measures

Project Approval Schedule 6 Condition 2(f) requires this Plan to include a program to investigate and implement ways to improve the environmental performance of the development over time. Improvement measures may be investigated through review of the following:

- monitoring data, and any assessment of trends;
- audit outcomes, including audits of public safety management measures; and
- incident reports, including any community complaints.

Reasonable and feasible improvement measures will be implemented and documented as a management measure in a revision to the Plan as described in section 7.3.

In accordance with Schedule 6 Condition 2(g) a protocol for periodic review of this Plan has been addressed under section 7.3.

8. Complaints management

Any complaints received in relation to public safety 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 a 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.
- 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.

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.

9. Plan implementation

9.1 Roles and responsibilities

During the operational phases of the development, the Narrabri Mine will be managed by the General Manager who will have overall responsibility for ensuring contractors, employees and service providers comply with all laws, regulations, licences, and approvals. Table 9-1 outlines the roles and responsibilities applicable to this EP-PSMP.

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 EP-PSMP.
Mine Manager	• Ensure all contractors, sub-contractors and service-personnel are appropriately qualified, competent, and licensed to undertake the required work under this EP-PSMP and have a good environmental performance record. • Ensure the subsidence monitoring program is implemented and adhered to.
Environmental Superintendent	• Ensure that all environmental monitoring and reporting is undertaken in accordance with this EP-PSMP and various approval requirements, and is checked, processed, and filed appropriately. • Communicate with statutory agencies and departments, public authorities and the community. • 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. • Liaise with stakeholders regarding subsidence impact management. • Authorise changes to this EP-PSMP.
Surface Operations Manager	• Provides notification to all mine personnel advising of potential subsidence hazards and impacts.
Civil Services Coordinator	• Manages the condition and safety of roads and tracks around the mine site. • Remediates subsidence impacts to maintain trafficability of access roads and tracks. • Maintains access to critical infrastructure and facilitates inspections and remedial works. • Designs and installs Personal Emergency Device (**PED**) cables (personal emergency device communications system).
Technical Services Manager	• Decommissions Surface to Inseam drainage sites and structures prior to subsidence impacts.
Registered Mine Surveyor	• Ensure that all subsidence monitoring is carried out in accordance with the Subsidence Monitoring Program to the accuracy required, within the specified timeframes and are checked, processed and filed appropriately.

10. 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.*

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

11. Glossary

Term	Definition
Active subsidence	The period of time that movement of the ground can occur after underground mining.
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 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 longwall panels LW 203 to LW 206.
Far-field displacement	Horizontal displacement outside of the angle of draw, associated with movement are due to horizontal stress relief above an extracted panel of coal. Far-field horizontal displacements of up to 20 mm (measurable limit) can occur for distances of 2 to 4 times the cover depth. The strains due to these movements are usually < 1 mm/m and do not cause damage directly. Such displacements have been associated with differential movement between bridge abutments and dam walls in the Southern Coalfield, but generally have not caused significant damage.
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.
Groundwater	Water contained in the interconnected pore spaces and voids of the saturated zone of sediments and rocks.
Horizontal displacement	Horizontal displacement of a point after subsidence has occurred above an underground mining area within the angle of draw. It can be predicted by multiplying the tilt by a factor derived for the near surface lithology at a site (e.g. a factor of 10 to 20 is normally applied for the NSW Coalfields depending on cover depth).
Incident	A set of circumstances that causes or threatens to cause material harm to the environment, and/or breaches or exceeds the limits of performance measures/criteria in this approval.
Material harm	Material harm to the environment is defined in section 147 of the *Protection of the Environment Operations Act 1997*
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.

Term	Definition
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 & 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.
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	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.
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

12. Review history

Revision	Comments	Author	Authorised by	Date

Attachment 1 - Compliance conditions relevant to this Plan

Table A1-1 Project Approval conditions directly relevant to this Plan

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 4
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 of the EP-PSMP
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 the following to the satisfaction of the Resources Regulator: • a Public Safety Management Plan to ensure public safety in the mining area	Section 1.4 Section 1.5
	***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 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;	N/A
	(b) a description of:	
	• the relevant statutory requirements (including any relevant approval, licence or lease conditions);	Section 1.4
	• any relevant limits or performance measures/criteria;	Section 4.1
	• 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 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 4

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
	(d) a program to monitor and report on the:	
	• impacts and environmental performance of the project;	Section 4.2
	• effectiveness of any management measures (see (c) above);	
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 5
	(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 7.4
	(g) a protocol for managing and reporting any;	
	• incidents;	Section 6.1
	• complaints;	Section 8
	• 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 7.3
Schedule 6 Condition 3	Within 3 months of the submission of an:	Section 7.3
	(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
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 1.6 Section 7.1
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 7.1
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 7.2

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
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 Community Consultative Committee 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 1.6 Section 7.1 Section 7.2 Section 8
	(b) keep this information up-to-date, to the satisfaction of the Secretary.	Section 1.6

Attachment 2 - Trigger Action Response Plan

Table A2-1 Trigger action response plan

Monitoring	Trigger	Action
Roads and access tracks		
To note any subsidence impacts that require remediation or implementation of additional traffic controls. **Sites:** Visual monitoring of affected roads and tracks. **Parameters:** Note any damage to roads that may cause traffic hazard (i.e. cracks, compression humps, ponded water on road surface). **Analysis**: Visual identification, refer to road management response tables in Attachment 3. **Frequency:** As required whilst active subsidence is affecting the road(s) and until any required remediation works are completed.	**Level 1** If inspections note that road is no longer trafficable or safe.	**Level 1** • Implement appropriate traffic control (may include hazard signs or temporary road closure). • Notify mine personnel. • Review potential detour options and provide alternative access (if available). • Initiate road repairs/reconstruction to restore affected section to a trafficable standard (refer to Attachment 3).
	Level 2 If vehicle accident occurs	**Level 2** • As for Level 1. • Apply appropriate emergency / first aid treatment if required. • Record and report incident in accordance with Narrabri Mine Health and Safety protocols. • Identify cause of accident. If subsidence impact related, review the effectiveness of the management/monitoring actions under this EP-PSMP and revise accordingly if required.
Water storage dams and soil conservation banks		
Condition		
To document pre- and post-subsidence condition and allow identification of required remedial works **Sites:** All dams **Parameters** Obtain xyz coordinates along of water storage dam embankments/spillways and along contour banks. Photographic records. **Analysis:** Pre- and post-mining comparison **Frequency:** Pre- and post-subsidence	**Level 1** • Post-subsidence survey identifies that spillway and dam wall not likely to operate as intended (i.e. spillway no longer lowest point on wall); or • Post-subsidence survey identifies that contour bank not likely to operate as intended (i.e. damaged due to cracking, areas no longer able to drain, or lengths with increased slope).	**Level 1** • Notify Environmental Superintendent. • Reduce stored water level (if not already reduced), assess and undertake repairs to wall or spillway as required. • Reconstruct or repair as required.
Dam failure		
To observe possible subsidence effects to dam wall and identify potential risk of impending dam failure **Sites**: All dams **Parameters**: Visual inspections noting their condition, water level, cracking or recent erosion of earth embankment. **Analysis**: Visual identification of changes **Frequency**: Daily during undermining of structure	**Level 1** Minor superficial surface cracking observed – no apparent water leaking through wall.	**Level 1** • Notify Environmental Superintendent. • Continue to monitor.
	Level 2 • Sudden drop in water level noted that it is not attributable to other recent activities or use. or • Deep cracking observed and water seepage through wall is visible (i.e. damp areas or signs of increased grass growth within embankment or immediately downstream) or severe cracking and visible signs of water discharging through earth embankment.	**Level 2** • As for Level 1 • Restrict access to the area • Reduce stored water level by pumping water out (release downstream) and maintain lowered water level until post-subsidence assessment and repairs can be carried out.
Property and livestock fences		

Monitoring	Trigger	Action
To note the condition and functionality of affected fences to ensure effective exclusion of stock from active subsidence area. **Sites**: All panels (LW 203 to LW 206) **Parameters**: Visual inspections of fences and gates/cattle grids within active subsidence area. **Analysis**: Visual observation. **Frequency**: On an as needed basis.	**Level 1** Damage observed to fences that can be attributed to subsidence movements.	**Level 1** • Notify Environmental Superintendent. • Undertake repairs as required.
Residential dwellings and machinery sheds		
Harmful substances		
To identify the presence of potentially harmful substances that may be released as a consequence of subsidence. **Sites**: All subsidence-affected buildings and structures. **Parameters**: Hazardous materials assessment. **Analysis**: Potentially affected building(s) to identify the presence of asbestos or other hazardous building materials/substances unable to remain in situ. **Frequency**: Prior to subsidence.	**Level 1** Survey reveals presence of asbestos or other hazardous material within the buildings or surrounds and that is considered a potential risk to the environment in the event of subsidence damage.	**Level 1** • Notify Surface Operations Manager. • Remove or 'make safe' (demarcate) any potentially hazardous building materials that would potentially pose a health or environmental threat as a result of subsidence impacts (i.e. damage to asbestos) prior to subsidence impacts.
Post-subsidence condition		
To assess post-subsidence condition of structure and determine if repair is practicable, cost-effective and safe **Sites**: All subsidence-affected buildings and structures **Parameters**: Post-subsidence structural assessment **Analysis**: Assessment of structural stability. **Frequency**: Post-subsidence	**Level 1** Structure collapses or is considered to be uneconomic to repair.	**Level 1** • Notify Surface Operations Manager. • Maintain safety fencing / exclusion of property to prevent access. • Demolish structure(s) and recycle/dispose of materials to a licensed waste facility.
Mine infrastructure		
Surface to inseam gas drainage wells		
To confirm site has been decommissioned and is stable and safe	**Level 1** Not fully decommissioned or considered unsafe to people or livestock.	**Level 1** • Notify Technical Services Manager. • Undertake additional works as required to remove remaining structures and rehabilitate. • Repair post-subsidence cracking or identified impacts as required.
PED Cable		
Maintain communications	**Level 1** No longer operational.	**Level 1** • Notify Technical Services Manager/Civil Services Coordinator. • Inspect to locate site of damage and replace or repair as required.
Unauthorised access		
Limited occurrences of unauthorised site access.	**Level 1** • Evidence of unauthorised access.	**Level 1** • Review and update site induction and security controls as required. • Review fencing and signage and undertake maintenance and improvements as required.

Attachment 3 - Road inspections and response

Road and access track inspections

Inspection of roads and access tracks will be undertaken as required. Inspections will be the responsibility of the Civil Services Coordinator (or delegate) and will be recorded using the checklist attached. Any required actions (as outlined below) will be reported to the Environmental Superintendent.

Impacts to roads - response

The level of response as detailed in Table A3-1 below has been developed to assist in implementing appropriate levels or response for a range of potential subsidence impacts to the unsealed access roads within the Mining Lease

Table A3-1 Road impact table

Impact	Full road width	Half road width	Road edge
Cracking > 100 mm wide	HIGH	HIGH	MODERATE
Cracking 20 mm – 100 mm wide	MODERATE	MODERATE	LOW
Cracking < 20 mm wide	MODERATE	LOW	LOW
Water ponding	HIGH	MODERATE	LOW
Compression humps	HIGH	MODERATE	LOW
Other	MODERATE	LOW	LOW

Where impacts are noted to roads, the measures presented in Table A3-2 will be implemented, noting that individual circumstances may require deviation from the proposed action. The order of priority for any contingency response under this EP-PSMP will be:

1. Ensure the safety of mine personnel.
2. Minimise the duration of inconvenience or disruption.
3. Repair in accordance with the level of impact (high, medium, or low) as identified in Table A3-2.

Table A3-2 Road response table

Level of impact	Response
HIGH	• Barricade affected area and notify landowner, affected occupants/road users. • Provide alternative access around hazard until remediation works are complete. • Proceed with remediation works within 24 hours and document all actions.
MODERATE	• Erect warning signs on both sides of hazard. • Notify landowner, occupants/road users. • Proceed with remediation works as soon as practicable and document all actions.
LOW	• Proceed with remediation works in accordance with normal maintenance procedures under this plan and document all actions.

Method of remediation and available resources

NCOPL maintains an earthworks contractor on site to maintain and repair all internal mine access roads. Where repairs are required under this EP-PSMP, the Civil Services Coordinator (or delegate) will direct the earthworks contractor to undertake the works. A range of plant and equipment including grader, excavator, front-end loader, and haul trucks will be maintained on site, and a stockpile of road gravel or similar will be stored on site for incidental repairs.

Subsidence Inspection Checklist (template)

Subsidence Inspection Checklist – Roads			
Date:		Panel No.	
Time:		Face position (chainage):	
Inspected by:		Area inspected	
Road(s) inspected			

Inspection Items	Present (Y/N)	Comments	Impact level (see Table A3-1)
Warning signage	*Y / N*	*In place / visible / undamaged?*	
Surface cracking	*Y / N*	*Present? Widths? Extent? Location?*	*High / Medium /Low*
Compression humps	*Y / N*	*Present? Widths? Extent? Location?*	*High / Medium /Low*
Damage to roadside drainage or ponding over pavement	*Y / N*	*Present? Widths? Extent? Location?*	*High / Medium /Low*
Safety issues / other impacts?	*Y / N*	*Details?*	*Risk?*

Remediation Required	Earthworks contractor notified?	Reported to Environmental Superintendent?
Summary details and timeframes for repair – see response table	*(Time/Date)*	*(Date)*

Signed:	