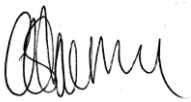
NARRABRI MINE

EXTRACTION PLAN

BUILT FEATURES MANAGEMENT PLAN

LW 203 – LW 206

Prepared by:

Title	Name	Signature	Date
Senior Environmental Project Manager	Carmen Osborne Onward Consulting		07 February 2023
Environmental Project Manager	Linden Burch Onward Consulting		07 February 2023

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Acronyms and abbreviations

Acronym	Description
º	degrees
CCC	Community Consultative Committee
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 (this document)
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)
FFD	far-field displacements
ha	hectare
HSE	health, safety and environment
IEA	Independent Environmental Audit
IPSMP	Individual Property Subsidence Management Plan
km	kilometre
LiDAR	light detection and ranging
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
NSC	Narrabri Shire Council
PED	personal emergency device (communications system)
ROM	run of mine
SIS	Surface to in-seam
SoC	Statement of Commitment
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 (**NSC**) 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 – Built Features Management Plan (**EP-BFMP** 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).

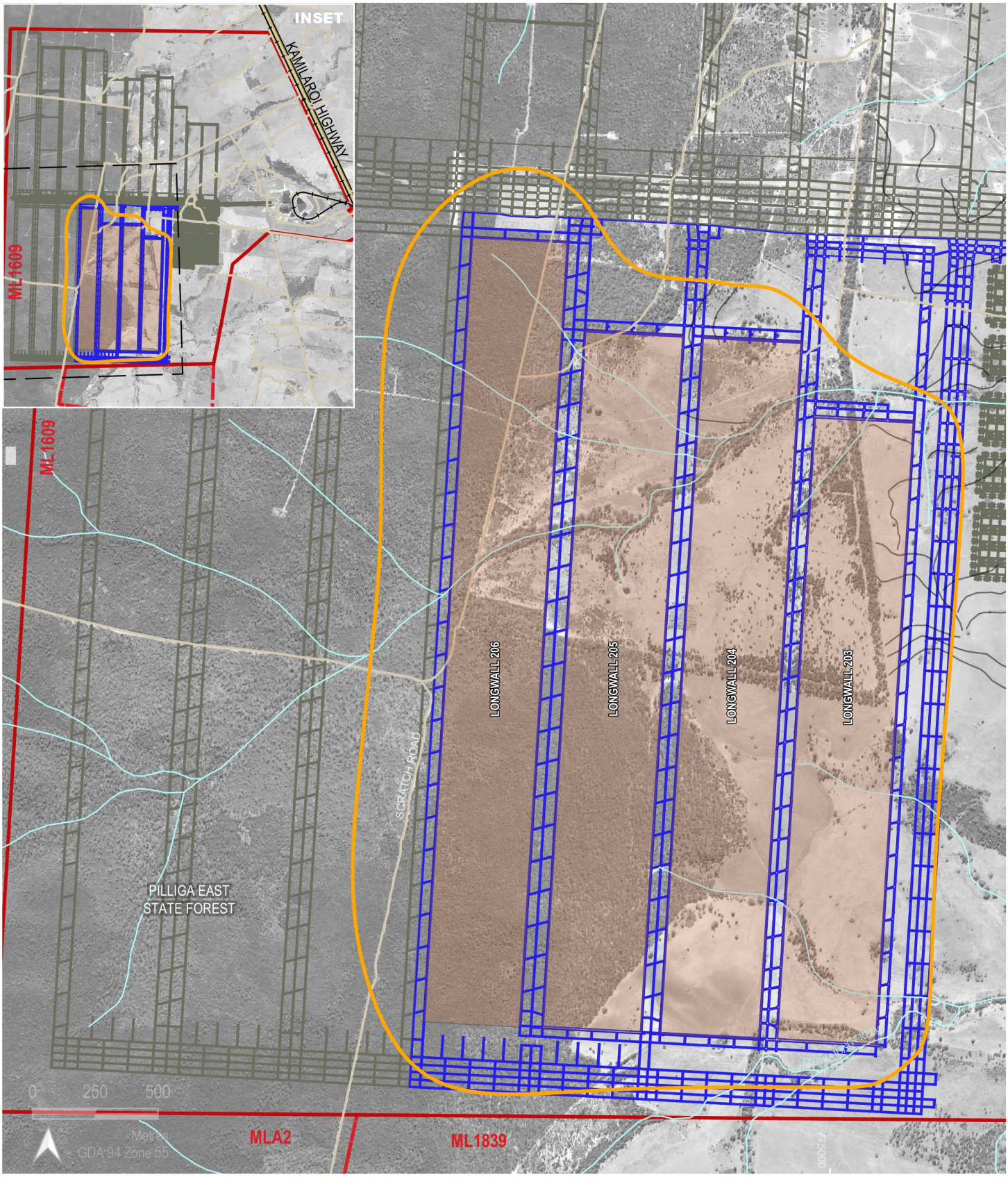
The EP-BFMP sets out the objectives, performance measures and management actions required to manage and monitor the potential impacts from subsidence on built features above LW 203 to LW 206 (the **Extraction Plan Area**[2]). This Plan forms Appendix E to the Extraction Plan for LW 203 to LW 206 (**EP 203-206**).

[1] For full details on the joint venture ownership, refer to Section 1 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 impacts on built features 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.



WHITEHAVEN COAL

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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

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FIGURE 1-1

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

1.3 Objectives

The objectives of this EP-BFMP are to:

- provide details of the relevant statutory requirements, including any relevant approval, licence or lease conditions;
- address in appropriate detail all items of public infrastructure and all classes of other built features;
- provides for subsidence risk assessment for all built features;
- identify appropriate pre-mining mitigation measures to reduce subsidence impacts;
- identify appropriate remedial measures and commitments to mitigate, repair, replace, or compensate all predicted impacts on potentially affected built features in a timely manner;
- 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 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 Built Features Management Plan which has been prepared to the satisfaction of the Resources Regulator and which provides for the management of potential subsidence impacts and/or environmental consequences of the proposed second workings.

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-BFMP 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-BFMP in which each of these conditions have been addressed. Table A1-2 provides a summary of the relevant Statement of Commitments (**SoCs**) and section of the EP-BFMP where these commitments 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.

In SoC 5.20 and 5.21, NCOPL has committed to reporting of subsidence impacts in regard to built features within an Individual Property Subsidence Management Plan (**IPSMP**) or similar as required under any Extraction Plan requirements. This BFMP has been prepared to satisfy the requirements of an IPSMP and as such includes the following information as required by SoC 5.21:

- timing and scale of predicted impacts (refer to section 3.1);
- monitoring of the affected property during mining (refer to Attachment 3);
- timing for any remaining disconnection of services (refer to Attachment 3); and
- post-mining inspection and reporting (refer to section 4.2, section 7 and Attachment 3).

As the above commitments and requirements of an IPSMP have been addressed by this EP-BFMP, IPSMPs will not be prepared for LW 203 to LW 206.

1.4.2 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-BFMP.

1.4.3 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

In accordance with Schedule 3 Condition 4(g) of the Project Approval, the EP-BFMP was prepared following appropriate consultation with the owner/s of potentially affected features. Consultation with NSC was undertaken for the preparation of this EP-BFMP, in relation to the predicted impacts to Scratch Road. The draft EP-BFMP (Revision A) was provided to NSC as Appendix E to EP 203-206 on 8 November 2022.

Narrabri Shire Council provided a response (dated 8 December 2022) confirming that Scratch Road is identified as a Forestry Road only and not a Council Road. Attachment 2 provides evidence of the NSC

consultation process, including a cross reference table addressing the comments received, and detailing the section of the Plan where these comments have been addressed (Table A2-1).

Schedule 3 Condition 4(g) also requires NCOPL to prepare the EP-BFMP 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- BFMP following the briefing session.

Any further amendments or updates to this Plan will be referred to NSC for further review and comment.

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-BFMP 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:

- *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.

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 impacts to built features within the Extraction Plan Area. 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.

Detailed control measures relevant to built features and a program for implementation are detailed in section 4, Attachment 3, Attachment 4 and Attachment 5.

3. Subsidence impacts and potential environmental consequences

3.1 Subsidence predictions

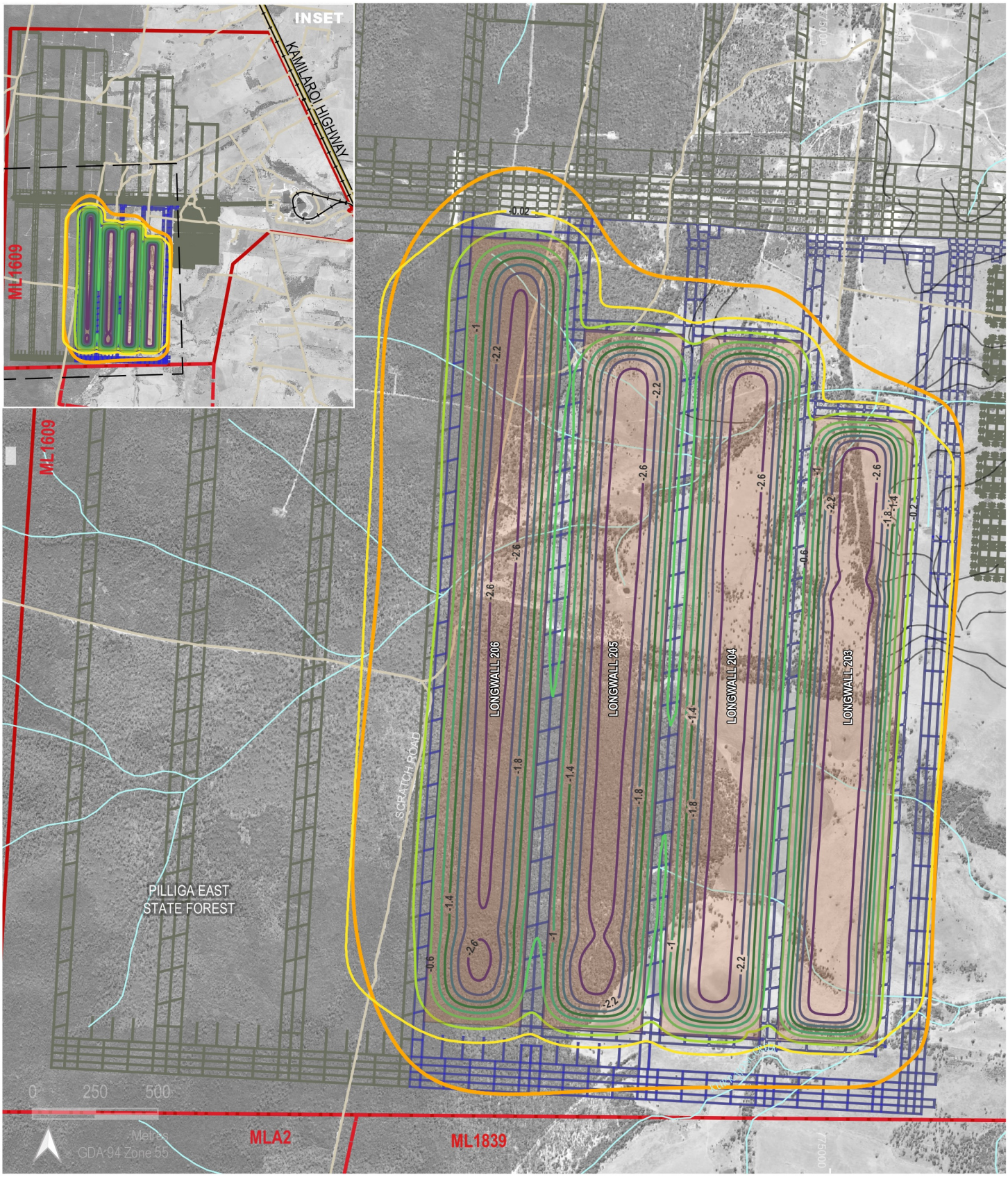
Subsidence predictions for the Extraction Plan Area were assessed and are presented in the Mine Subsidence Assessment Report. The Mine Subsidence Assessment Report details the potential impacts to natural, man-made and Aboriginal heritage features, including public safety, within the Extraction Plan 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 - 54	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).

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: DGS 2022 (Table 7)
* - 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 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 Affected built features

A range of built features are located within the Extraction Plan Area, which are summarised as:

- water storage dams and soil conservation (contour) banks;
- roads and access tracks, including unsealed gravel access tracks;
- property and livestock fences;
- residential dwellings and machinery sheds;

[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.

- mine infrastructure, including groundwater supply and monitoring bores;
- domestic power and telecommunication lines; and
- State Survey Marks.

Two unsealed access road (Red Hills and Scratch Road) traverses the Extraction Plan Area above LW 205 and LW 206 (Plan 2 of Appendix H to EP 203-206). This infrastructure is further discussed in section 3.2.2.

3.2.1 Water storage dams and soil conservation (contour) banks

There are 17 farm dams used for livestock watering within the Extraction Plan Area. Non-engineered farm dams and water storages are susceptible to surface cracking and tilting (i.e. storage level changes) due to mine subsidence. The tolerable tilt and strain values for the dams (before remediation is required) will depend upon the dam wall materials, construction techniques, and foundation type.

The likely subsidence effects for each dam are summarised in Table 3-3.

Table 3-3 Maximum final subsidence effect predictions for farm dams

Panel	No. existing dams	Cover depth (m)	Subsidence (m)	Tilt (mm/m)	Tensile strain* (mm/m)	Compressive strain* (mm/m)
203	12 (D40, D45-D51, D61-D64)	200 - 240	0.02 - 2.80	1 - 50	3 - 15	4 - 20
204	2 (D41, D44)	220 - 240	0.40 - 2.80	5 - 50	3 - 15	7 - 19
205	3 (D42, D43, D70)	250 - 260	0.40 - 2.65	15 - 30	3 - 12	7 - 19
206	Nil	-	-	-	-	-

Source: Table 14 (DGS 2022)

* - discontinuous strains (2 x smooth profile strains)

The expected phases of tensile and compressive strain development may result in breaching of the dam walls or water loss through the floor of the dam storage area. Loss or increase of storage area may also occur due to the predicted tilting. Maximum tensile crack widths across dam wall or storage areas are estimated to range between 30 mm and 400 mm.

Surface ‘steps’ or heaving due to compressive shear failures are estimated to range between 30 mm and 500 mm. Impacts to windmills and fences near the dams and soil conservation (contour) banks may also occur and require repair following mining.

A number of contour banks exist across the Extraction Plan Area, particularly in cleared areas which have been historically used for cropping. These banks act to manage water flow across the site, minimise erosion and reduce sediment transport. Generally speaking, contour banks are constructed to have very low longitudinal gradients (i.e. less than 0.5 %) or even zero grade. The banks are generally constructed from local soil material, as either a back-push or front-push bank).

Subsidence of sections of contour banks are likely to prevent the banks performing their intended purpose by altering the longitudinal grade, either steepening the grade, or causing a section to pond (i.e. unable to drain).

Cracking and ground deformations may also cause damage to the bank, resulting in possible erosion or bank failure.

3.2.2 Access roads

The existing access roads comprise unsealed gravel carriageways that provide access across the Extraction Plan Area. It is assessed that they will be subsided and impacted by the longwall panels as detailed in Table 3-4.

Table 3-4 Maximum final subsidence effect predictions for access roads

Panels	Cover depth (m)	Subsidence (m)	Tilt (mm/m)	Tensile strain (mm/m)	Compressive strain (mm/m)	Crack widths (mm)
LW 203 to LW 206	185 - 320	0.1 - 2.80	33 - 61	7- 31 (62)	7 - 35 (70)	220 - 640

Source: Table 15 (DGS 2022)
(brackets) - discontinuous strains (2 x smooth profile strains).

The unsealed gravel access roads (Red Hills, Scratch Road) and tracks are likely to be damaged by cracking and shearing/heaving in the tensile and compressive strain zones, respectively.

Maximum tensile crack widths across or along roads are estimated to range between 220 mm and 640 mm. Surface ‘steps’ or humps due to compressive shear failures are estimated to range between 100 mm and 360 mm. Some sections of road may therefore require re-grading or drainage remediation works after subsidence development.

3.2.3 Property fences and livestock

The fence lines and grazing areas within the Extraction Plan Area will be subject to the maximum predicted subsidence effects and cracking as presented in Table 3-5.

Table 3-5 Maximum final subsidence effect predictions for fences and livestock grazing paddocks

Panels	Cover depth (m)	Subsidence* (m)	Tilt (mm/m)	Tensile strain (mm/m)	Compressive strain (mm/m)
LW 203 to LW 206	185 - 240	0.1 - 2.80	20 - 53	7 - 31 (62)	7 - 35 (70)

Source: Table 16 (DGS 2022)
* - Subsidence range = Mean Tailgate Chain Pillar Subsidence to Maximum Panel Subsidence; (brackets) - discontinuous strains (2 x smooth profile strains).

Impacts to fences are likely to include:

- Straining and possibly tensile failure of fencing wire strands in tensile strain zones;
- Sagging of fencing wire strands and possibly loss of fence serviceability in compressive strain zones;
- Loss of gate function in either tensile or compressive strain zones; and
- Tilting of fence, gate and strainer posts, leading to the outcomes mentioned above.

3.2.4 Residential dwellings and machinery sheds

There are two NOCPL-owned properties with dwellings above the proposed LW 204 ('Westhaven' and an un-named property).

Moderate to significant damage to the existing buildings and tanks are likely where tilts exceed 7 mm/m and tensile or compressive strains exceed 4 mm/m. The severity of the damage will also be dependent on the type and geometry of each structure and whether localised 'humps' and 'troughs' develop over the goaf as it consolidates.

Impacts to the buildings are likely to include high residual tilt, distortion of frames, sticking doors and windows, splitting/shearing of support posts, and loss of weather tightness and floor bearer or support. The dimension and type of building will allow significantly higher strain (> 5 mm/m) and curvature > 1 km^{-1} to occur before significant impact develops. Similar impacts are assessed for the machinery sheds, with potential collapse due to frame distortion and connection failure.

Refer to Appendix H Plan 2 of EP 203-206 for the locations of buildings and sheds within the Extraction Plan Area.

'Westhaven'

There is one single storey weatherboard clad and timber framed residence ('Westhaven') on timber stump footings (12 m x 8.5 m) and two galvanised iron clad timber post sheds above LW 204. Both buildings are in disrepair and un-tenanted.

It is likely that the structures will be subsided between 1.7 m to 2.0 m by LW 204 with tilts ranging from 7 mm/m to 22 mm/m, hogging and sagging curvatures of 0.2 to 0.5 km^{-1} (radii of 5 km to 2 km) and tensile and compressive strains 2 mm/m to 5 mm/m. The building is likely to be 'moderately' to 'significantly' impacted by tilt and 'slightly' to 'moderately' impacted by curvatures and strains in accordance with *AS 2870-2011 Residential slabs and footings*.

Impacts to the 'Westhaven' buildings are likely to include high residual tilt, distortion of frames, sticking doors and windows, splitting/shearing of support posts, and loss of weather tightness and floor bearer or support. The dimension and type of building will allow significantly higher strain (> 5 mm/m) and curvature > 1 km^{-1} to occur before significant impact develops. Similar impacts are assessed for the machinery sheds, with potential collapse due to frame distortion and connection failure.

The site has underground power and telecommunications running to the residence from the suspended services at the access road which has now been disconnected.

'Un-named' property

An NCOPL-owned dwelling is located above the chain pillars between LW 204 and LW 205. The partially completed circular steel-framed structure is two-storeys high with a diameter of approximately 15 m and supported on a central column. There are no other features except for an olive grove to the south that was in a poor condition.

It is likely that the structure will be subsided by 0.45 m by LW 204 to LW 205 with tilts ranging from 5 mm/m to 15 mm/m, hogging curvature of 0.5 km^{-1} (radius of 2 km) and tensile strains of up to 10 mm/m. The building is likely to be 'moderately' to 'significantly' impacted by mine subsidence effects in accordance with *AS2870-2011 Residential slabs and footings*.

3.2.5 Mine infrastructure including groundwater supply and monitoring bores

Water supply bores

Two groundwater supply bores (GW022595 and GW000014) are installed over LW 203 and LW 204, respectively, at depths ranging from 30.4 m to 122.4 m (or 108 m to 196 m above the Hoskissons Seam). The bores are located in aquifers associated with the Purlawaugh and Napperby Formations. Both bores are owned by NCOPL and are no longer in use. Notwithstanding, these bores are predicted to have a high risk of significant subsidence impacts (Table 3-6).

Groundwater monitoring bores

Four groundwater monitoring bores (P8 to P11) and are installed at depths ranging from 30 m to 348 m, or from 259 m above to 28 m below the Hoskissons Seam.

The potential for significant well casing impact (i.e. loss of well function due to closure or rupture of casing) has been based on horizontal shear displacement and vertical strain estimates. The impacts are expected to increase with severity where bores are intersected by A-Zone fracturing.

The predicted impacts to the existing groundwater monitoring bores are summarised in Table 3-6.

The groundwater monitoring bores that are located over the proposed longwall limits are predicted to have a ‘high’ risk of significant impact to well casing.

Bore P8 is located approximately 1.2 km outside the limits of longwall mining (i.e. 3.75 times the cover depth) and has a ‘low’ risk of being impacted by horizontal bedding shear movements.

The locations of the water supply bores and groundwater monitoring bores are shown on Plan 2 (Appendix H to EP 203-206).

Table 3-6 Groundwater monitoring bores and predicted impacts

Bore ID	Location	Cover to mine roof H (m)	Depth to base z (m)	Base height above mine roof y(m)	y/H	Predicted A-zone height A (m)	Predicted well subsidence (m)	Predicted vertical strain* (mm/m)	Predicted bedding slip / shear^ (mm)	Impact risk
GW000014	LW 204	231	122.4	108	0.47	205	1.75	+/- 4 to 15	400	High
GW022595	LW 203	226	30.4	196	0.87	194	1.1	+/- 4 to 15	400	High
P10	LW 205	255	130	125	0.49	215	2.6	+/- 4 to 15	380	High
P11	LW 205	255	50	205	0.80	215	2.6	+/- 4 to 15	380	High
P9	LW 203	224	30	194	0.87	194	1.6	+/- 4 to 15	400	High
P8	0.75 km west of LW 206	324	65	259	0.80	0	0.0	0.0	5	Low

Source: Table 17 (DGS 2022)
***** Vertical strain from extensometer data. Tensile strains are positive.
^ - Shear = Tilt*t/2

3.2.6 Other rural infrastructure

Other items of rural infrastructure within the Extraction plan Area include several aboveground water storage tanks and timber pole suspended domestic power supply and telecommunication lines. There are also small pump sheds adjacent to some of the larger farm dams or bores.

The domestic power and telecommunication lines to the existing houses have been historically disconnected. Impacts to the timber poles will be repaired by NCOPL.

3.2.7 State Survey Marks

There is one State Surveys Mark located within the Extraction Plan Area that is predicted to be subsided by up to 1.52 m. The location of the State Survey Mark and corresponding subsidence is provided in Table 3-7 and shown on Plan 2 (Appendix H to EP 203-206).

Table 3-7 Predicted subsidence at State Survey Marks

Survey Mark	Easting (m)	Northing (m)	Predicted subsidence (m)
SS43428	774338	6620068	1.52

Source: Table 22 (DGS 2022)

4. Subsidence management

4.1 Performance measures and indicators

Built features performance measures are defined under Schedule 3 Condition 2 of the Project Approval and have previously been reproduced in Table 1-1. NCOPL will ensure that:

- built features are always safe;
- serviceability is maintained wherever practicable, and that loss of serviceability be fully compensated;
- damage is fully repairable, and must be fully repaired, or else replaced or fully compensated; and
- negligible additional risk to public safety.

Additional specific performance indicators for individual built features have been developed and are listed in Table 4-1. These performance measures align with the EP-BFMP objectives outlined in section 1.3.

Table 4-1 Built features performance measures

Feature	Performance measure / indicator
Water storage dams and soil conservation banks	
Farm dams	Capacity and function of existing dams is restored post-subsidence and no unplanned discharge of water downstream due to subsidence damage.
Soil conservation works	Capacity and function of existing contour banks is restored post-subsidence.
Roads and access tracks	
Roads (all)	Access to and within ML 1609 is maintained.
Culverts	All culverts are fully functional after active subsidence.
Property and livestock fences	
Fences	Functionality of fencing remediated after active subsidence.
Livestock	No unplanned stock movements as a result of subsidence damage.
Residential dwellings and machinery sheds	
Dwellings and sheds	• Buildings repaired and returned to use if practicable, cost-effective, and safe, otherwise demolished. • Safety risk to staff as a result of subsidence-related structural damage managed to prevent injury. • Harmful substances managed to prevent impacts.
Domestic power and telecommunication lines	
Power supply lines	Services to be disconnected prior to mining.
Telecommunication lines	Services to be disconnected prior to mining.
Mine infrastructure	
Surface to in-seam (**SIS**) gas drainage infrastructure	Decommissioned and made safe prior to being affected by subsidence.
Groundwater supply and monitoring bores	Reinstall where required for ongoing groundwater monitoring purposes.
Surface gas pipelines	Gas pipelines are constructed of polypipe and will not be significantly impacted by subsidence.

Feature	Performance measure / indicator
Personal emergency device (communications system) (**PED**) cable	Design/install PED cable to avoid subsidence impacts.
State Survey Marks	
State Survey Marks	At the completion of subsidence, or otherwise as required by the Surveyor General, ensure that the functionalities of any survey marks affected by subsidence are fully restored to the satisfaction of the Surveyor General.

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. Actions for subsidence management and monitoring have been developed for each of the identified built features and are detailed within Attachment 3 (Built Features Management) and Attachment 4 (Road Inspections and Response). Based on the conclusions in the Mine Subsidence Assessment Report, the specific actions for the management of subsidence impacts are categorised under monitoring, management, and notification and consultation.

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.

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-BFMP management measures in accordance with section 7.4.

A Trigger Action Response Plan (Attachment 5) has been developed to identify, assess, and respond to triggers and manage risks associated with meeting the built features performance measures.

6. Incidents and non-compliances

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 (**EPA**) 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 built features.

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-BFMP. 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-BFMP 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-BFMP 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 built features 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 built features 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-BFMP.

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-BFMP.
Mine Manager	• Ensure all contractors, sub-contractors and service-personnel are appropriately qualified, competent, and licensed to undertake the required work under this EP-BFMP 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-BFMP 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-BFMP.
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 PED cables (personal emergency device communications system).
Technical Services Manager	• Decommissions SIS 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
A-zone fracturing	Continuous Fracture Zone.
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*
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.

Term	Definition
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.
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 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 4.2
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-BFMP
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 Built Features Management Plan to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which:	Section 1.4.1 Section 1.5
	▪ addresses in appropriate detail all items of public infrastructure and all classes of other built features; and	Section 3.2 Section 4
	▪ has been prepared following appropriate consultation with the owner/s of potentially affected features	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

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
	• 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 4.2 Attachment 3 Attachment 4 Attachment 5
	(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

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

Table A1-2 Relevant Statement of Commitments

SoC requirements		BFMP reference
SoC	**Summary of the requirement**	
5.17	Monitor surface features (such as culverts) within 800m of the eastern edge and 1.5km of the western edge of the Mining Area.	Section 4.1 Section 4.2 Attachment 3 Attachment 4
5.18	In the event of damage to surface structures such as pipes, culverts, water tanks, dams or other soil or water conservation structures, repair the damaged infrastructure or provide appropriate compensation.	Section 4.2 Attachment 3 Attachment 4
5.19	Commission a dilapidation survey and inspection of all structures on non-project related land within the Mine Site by a qualified building consultant.	Attachment 3
5.20	Use the dilapidation survey and subsequent report in an individual property subsidence management plans (IPSMP) prepared for each property to be impacted (to provide fair and reasonable outcomes between the affected property owner and the Proponent).	Section 1.4.1
5.21	Each IPSMP will address the following issues. • Timing and scale of predicted impacts.	Section 1.4.1 Attachment 3

SoC requirements		BFMP reference
SoC	**Summary of the requirement**	
	• Monitoring on the affected property during mining. • Timing for any remaining disconnection of services. • Post-mining inspection and reporting.	

Attachment 2 Consultation records

This information is provided by Narrabri Shire Council

Our Reference:	DLA:MH:2029147
Your Reference:	PAE-50417206
Contact Name:	Michelle Henry

Narrabri Coal Operations Pty Ltd
Whitehaven Coal Ltd
10 Kurrajong Creek Rd
BAAN BAA NSW 2390

Via: Major Projects site

Thursday 8 December 2022

Re: Narrabri Coal Stage 2- Post Approval Consultation (PAE-50417206) Draft Extraction Plan for LW 203 to LW 206 - Built Features Management Plan and Land Management Plan - Council Review

To whom it may concern,

Thank you for the opportunity to provide comment on the abovementioned Plans.

Council understands that due to delays in receiving Commonwealth approval for the Stage 3 project, NCOPL are revising the secondary approval strategy to ensure the continuation of mining operations under the current Stage 2 Project Approval (PA 08_0144). This will require the draft Extraction Plan for LW 203 to LW 206 to be prepared to comply with the conditions under PA 08_0144 (Stage 2).

In accordance with Schedule 3, Condition 4(g), of the Project Approval (PA 08_0144), NCOPL are required to prepare a Built Features Management Plan in consultation with the owner of potentially affected features. In addition, Condition 4(h) of the Stage 2 Project Approval (PA 08_0144) requires NCOPL to prepare a Land Management Plan in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general.

Narrabri Shire Council have now reviewed the provided plans and whilst the Built Features Management Plan does mention a potential impact to a public road, Scratch Road is identified as a Forestry Road only and not a Council Road. Therefore, given that these two documents do not directly impact Council's Infrastructure Assets, the following comments are provided:

- NCOPL should ensure they continue to comply with the requirements of any existing and future consents/approvals.
- NCOPL should continue to be transparent and maintain open lines of communication with Narrabri Shire Council and the wider community,
- NCOPL should continue to regularly update their website with any new or modified approvals, the minutes of any public meetings and any complaints registers.
- NCOPL should continue to investigate and implement ways to improve the environmental performance of the development.
- Council generally concurs with the contents of the Plan and is supportive of ongoing monitoring and assessment in accordance with the project approval.

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

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

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

This information is provided by Narrabri Shire Council

- Council requests any further amendments or updates to the plan/s should be referred for further review and comment.

Thank you for the opportunity to provide feedback. Should you require any additional information or clarification in relation to this matter you are invited to contact Council's Planning and Sustainability Department or the undersigned on (02) 6799 6866, or by emailing council@narrabri.nsw.gov.au.

Yours faithfully

Michelle Henry
Manager Planning and Development

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Print Date: 8 December 2022, 2:00 PM

Table A2-1 Consultation feedback - NSC

Consultation feedback	Outcome	Document reference
Narrabri Shire Council have now reviewed the provided plans and whilst the Built Features Management Plan does mention a potential impact to a public road, Scratch Road is identified as a Forestry Road only and not a Council Road.	A paragraph has been added to section 1.5 which states “Narrabri Shire Council provided a response (dated 8 December 2022) confirming that Scratch Road is identified as a Forestry Road only and not a Council Road.” Reference to Scratch Road being a public road has been amended throughout this EP-BFMP. Attachment 3 Table A3-2 has been updated to state “Road maintenance with respect to Forestry Corporation NSW (FCNSW) access roads will need to consider the conditions of the Forest Permit.”	Section 1.5 Attachment 3
Given that these two documents do not directly impact Council’s Infrastructure Assets, the following comments are provided: • NCOPL should ensure they continue to comply with the requirements of any existing and future consents/approvals.	Section 1.4 Statutory requirements provides an overview of the applicable approvals. Attachment 1 provides a compliance table which lists all applicable approval conditions with a cross reference to the section of the Plan where these conditions have been addressed.	Section 1.4 Attachment 1
• NCOPL should continue to be transparent and maintain open lines of communication with Narrabri Shire Council and the wider community.	Communication with NSC and the wider community is conducted in accordance with Section 4.7 (Information Dissemination, Complaints, Incident Management and Dispute Resolution) of the Narrabri Mine Environmental Management Strategy (EMS)which states “Dissemination of information to the local community and relevant agencies regarding the mining operation, its progress and environmental management performance, will be achieved by both formal and informal means including the following: • CCC Meetings • Annual Review (AR) • Other methods such as regular formal and informal contact with relevant government agencies, non-compliance reporting, local press, and the provision of newsletters.	Section 4.7 of the EMS

Consultation feedback	Outcome	Document reference
• NCOPL should continue to regularly update their website with any new or modified approvals, the minutes of any public meetings and any complaints registers.	Section 1.6 Access to information states "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." Section 8 Complaints management states that "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." Section 4.7 of the EMS states "The minutes of the CCC meetings will be available on the Whitehaven website." All new or modified approvals will continue to be uploaded to the Whitehaven website.	Section 1.6 Section 8 Section 4.7 of the EMS
• NCOPL should continue to investigate and implement ways to improve the environmental performance of the development.	Section 7.4 Improvement measures states "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 built features 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."	Section 7.4
• Council generally concurs with the contents of the Plan and is supportive of ongoing monitoring and assessment in accordance with the project approval.	Noted	N/A

Consultation feedback	Outcome	Document reference
• Council requests any further amendments or updates to the plan/s should be referred for further review and comment.	A sentence has been added to section 1.5 which states “Any further amendments or updates to this Plan will be referred to NSC for further review and comment.”	Section 1.5

Attachment 3 Built features management

Table A3-1 Management of water storage dams and soil conservation contour banks

Water storage dams, tanks, and soil conservation contour banks				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Obtain xyz coordinates along contour banks and water storage dams, e.g. light detection and ranging (**LiDAR**) data.	Pre-mining (baseline) and post-mining.	Registered Mine Surveyor	Document internally
1.2	Photographic records of all dams and contour banks within the Extraction Plan Area.	Pre-mining (baseline) and post-mining.	Environment Superintendent	Document internally
1.3	Visual inspections of dams and tanks noting their condition and any changes in accordance with the Subsidence Monitoring Program.	Daily during active subsidence.	Environment Superintendent	Document internally
2	**Management**			
2.1	Maintain safe access to water storage dams and contour banks to allow for personnel to undertake inspections, maintenance and remediation works (if required).	Ongoing.	Civil Services Coordinator	Document internally
2.2	Assess each dam prior to mining to determine need to drain (fully or partially) prior to subsidence to reduce risk of dam wall failure or mine inflows, or if any modifications are required to dam wall and spillway. If lowered/drained, water level will be maintained for duration of mining until assessment and repairs are completed (i.e. excess water pumped out following rainfall).	Complete assessments prior to mining, with modifications to be completed prior to subsidence impacts occurring.	Environment Superintendent	Document internally
2.3	Assess each dam to determine any required remediation works (which may include): • repairs or reconstruction of earth dam wall(s) to ensure stability; • repair or reinstatement of level spillways for dam overflows; and • repair of cracking in / around dam to prevent future erosion Repairs will aim to restore as close as practicable the pre-mining storage capacity of each dam, unless otherwise identified under a site management plan regarding the final land-use/rehabilitation strategy.	Post-subsidence, within 12 months of mining.	Environment Superintendent	Annual review
2.4	Reconstruct contour banks affected by subsidence to a similar grade, capacity, spacing and location as the pre-mining condition (baseline) or in accordance with recommendations provided in the *Saving Soil: A landholder's guide to preventing and repairing erosion* (Alt et al, 2009) or similar.	Post-subsidence, within 12 months of mining.	Environment Superintendent	Annual review
2.5	Remediate and/or replace water storage tanks, as required.	Post-subsidence, within 12 months of mining.	Environment Superintendent	Annual review

Water storage dams, tanks, and soil conservation contour banks				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
3	**Notification, consultation, and reporting**			
3.1	None proposed under this EP-BFMP.			

Table A3-2 Management of roads, access tracks, power, and telecommunications

Roads, access tracks, power, and telecommunications				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Visual monitoring of access roads and any affected internal access tracks to note any subsidence impacts that require remediation or implementation of additional traffic controls.	On an as-needed basis (access tracks and roads are used daily by mine personnel).	Environment Superintendent / Civil Services Coordinator	Document internally (refer to checklist in Attachment 4)
2	**Management**			
2.1	Where practicable, gates to NCOPL properties will be kept locked to prevent unauthorised access, or alternatively, signage placed noting access restrictions (i.e. authorised persons only) and potential hazards.	To be maintained throughout mining.	All staff	Document internally
2.2	Temporary signage will be erected on access roads during active subsidence (at both approaches to the subsiding section), advising of potential subsidence risks. The signage may be relocated following the completion of active subsidence and subsequent remediation works.	Prior to longwall progressing below access roads.	Civil Services Coordinator	Document internally
2.3	Repair road(s) during active subsidence to temporarily remediate subsidence impacts to the road surface and to allow safe passage for vehicles (refer to Attachment 4). Road maintenance with respect to Forestry Corporation NSW (**FCNSW**) access roads will need to consider the conditions of the Forest Permit.	Daily (if required) during active subsidence.	Civil Services Coordinator	Document internally
2.4	Construction of new, or remediation of existing tracks will aim to maintain or improve the current standard of tracks, with consideration to the minimisation of erosion and the recommendations made in *Managing Urban Stormwater: Soils and Construction, Volume 2c Unsealed Roads* (Department of Environment and Climate Change, 2008) where appropriate.	As required. Remediation to occur within 1 month of undermining.	Environment Superintendent	Document internally
2.5	Domestic power supply and telecommunications lines will be switched off prior to mining to ensure safety.	Prior to longwall progressing below power or telecommunication lines.	Electrical Services Coordinator	Document internally

Roads, access tracks, power, and telecommunications				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
2.7	Any damage to domestic power supply and telecommunications lines will be remediated and repaired as required.	As required. Remediation to occur within 6 months of undermining.	Electrical Services Coordinator	Document internally
3	**Notification, consultation, and reporting**			
3.1	Provide notification to mine 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.	As required.	Surface Operations Manager	Document internally
3.2	Provide written notification to Forestry Corporation of NSW 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.	Prior to active subsidence	Environmental Superintendent	Document internally

Table A3-3 Management of property and livestock fences

Property and livestock fences				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Survey (aerial) to identify all existing fence lines and location and type of gates or access points (i.e. cattle grids).	Pre-subsidence (baseline).	Registered Mine Surveyor	Document internally
1.2	Visual inspections of fences and gates/cattle grids within active subsidence zone noting their condition and functionality.	On an as needed basis.	Environment Superintendent	Document internally
2	**Management**			
2.1	Exclude stock from areas of active subsidence or during remediation by relocation or temporary fencing as required.	In advance of longwall extraction.	Environment Superintendent	Document internally
2.2	NCOPL or nominated contractor to rectify any impacts to property or livestock fences/gates.	Post-subsidence, prior to re-stocking.	Environment Superintendent	Document internally
3	**Notification, consultation and reporting**			
3.1	None proposed under this EP-BFMP.			

Table A3-4 Management of dwellings and structures

Residential dwelling and machinery sheds				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Undertake assessment of potentially affected building(s) to identify the presence of asbestos or other hazardous building materials/ substances unable to remain in situ.	Prior to undermining.	Surface Operations Manager	Document internally
2	**Management**			
2.1	Entry to all farm machinery and storage sheds will be restricted prior to and throughout active subsidence.	Prior to mining and during active subsidence.	Surface Operations Manager	Document internally
2.2	Services to subsidence-affected buildings to be disconnected.	Prior to mining.	Surface Operations Manager	Document internally
2.4	Where buildings/structures are to be retained they will be inspected by a person(s) suitably qualified to assess their structural stability. Structures will only be returned to use once it is confirmed that the structures are sound and fit for purpose.	Following completion of active subsidence. Prior to intended re-use.	Surface Operations Manager	Document internally
2.5	Buildings affected by subsidence will remain secured to prevent unauthorised access until such time as they are structurally assessed, demolished, or repaired, as required.	Following completion of active subsidence. If demolished this will occur within 2 years.	Surface Operations Manager	Document internally
3	**Notification, consultation and reporting**			
3.1	None proposed under this EP-BFMP			

Table A3-5 Management of mine infrastructure

Mine infrastructure				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Inspect decommissioned SIS gas drainage sites to confirm all structures have been safely decommissioned and site is stable and safe.	Prior to mining and following active subsidence.	Technical Services Manager	Document internally
1.2	Survey collars of all affected piezometers and standpipes to confirm accurate levels for monitoring of groundwater.	Prior to mining and following active subsidence.	Environmental Superintendent	Document internally
1.3	Continue to monitor subsidence affected groundwater piezometers and standpipes following active subsidence (note: life-of-mine network installed outside of Extraction Plan Area to monitor impacts).	Ongoing.	Environmental Superintendent	Document internally

Mine infrastructure				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
2	**Management**			
2.1	Decommission SIS gas drainage sites prior to active subsidence.	Prior to mining.	Technical Services Manager	Document internally
2.2	A determination of the appropriate action for reinstatement or correction of impacted groundwater monitoring bores will be determined in consultation DPE Water.	Following active subsidence.	Environmental Superintendent	Document internally
2.3	Reinstate or correct groundwater monitoring bores identified as having been impacted by subsidence within three months of detection (where possible). Additional monitoring bores may be required to replace the function of impacted monitoring bores, if necessary.	Following active subsidence.	Environmental Superintendent	Document internally
2.4	Water supply bores may not be able to be reinstated above longwall extraction zones until significant groundwater recovery has occurred after mining. It is therefore likely that an alternate water source will be required after longwall mining commences.	Following active subsidence.	Environmental Superintendent	Document internally
2.5	Design and install PED cable with enough 'slack' for subsidence-related impacts.	Prior to mining.	Civil Services Coordinator	Document internally
3	**Notification, consultation, and reporting**			
3.1	Notify DPE Water within two weeks of identification of detection of impacted groundwater monitoring bore.	Following active subsidence.	Environmental Superintendent	Document internally
3.2	Inform groundwater monitoring personnel of any water level changes.	Following active subsidence.	Environmental Officer	Document internally

Table A3-6 Management of survey marks

Survey marks				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Approval to be sought under the *NSW Surveying and Spatial Information Regulation 2017* as required by the *Surveyor-General's Direction No. 11 Preservation of Survey Infrastructure*, prior to removing, damaging, destroying, obliterating, or defacing any survey marks.	Application must be made at least 14 days prior to active subsidence.	Registered Mine Surveyor	Notify Surveyor General
2	**Management**			

Survey marks				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
2.1	Once undermined, restore the survey mark and submit the updated details to the Surveyor General.	Following active subsidence (i.e. difference between 6-monthly surveys is within measurable limits).	Registered Mine Surveyor	Notify Surveyor General
3	**Notification, consultation, and reporting**			
3.1	Surveyor General to be notified as outlined above.	Prior to and post mining, as outlined above.	Registered Mine Surveyor	Notify Surveyor General

Attachment 4 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 A4-1 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-BFMP 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 A4-2 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-BFMP, the Civil Services Coordinator (or delegate) will direct the earthworks contractor to undertake the works. A range of plant and equipment including grader, roller, 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 Technical Services Manager?
Summary details and timeframes for repair – see response table	(Time/Date)	(Date)

Signed:	

Attachment 5 Trigger action response plan

Table A4-1 Trigger action response plan

Monitoring	Trigger	Action
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 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.
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 4).
	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-BFMP and revise accordingly (if required).
Property and livestock fences		
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.

Monitoring	Trigger	Action
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 that is considered a potential risk to the environment and/or personnel health in the event of subsidence damage.	**Level 1** • Notify Surface Operations Manager. • Remove or 'make safe' (demarcate) any potentially hazardous building materials that may 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		
SIS 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.
Groundwater monitoring bores		•
Reinstatement of water bores.	**Level 1** Groundwater monitoring bores predicted to have a 'high' risk of significant impact to well casing.	**Level 1** • Reinstate groundwater monitoring bores following significant groundwater recovery has occurred after mining. • Additional monitoring bores may be required to replace the function of impacted monitoring bores (if necessary).
Survey marks		
Pre- and post-mining notifications for impacts.	**Level 1** Notify impacts to Survey marks 14 days prior to impact.	**Level 1** Registered Surveyor to update details following mining.