NARRABRI MINE

EXTRACTION PLAN

BUILT FEATURES MANAGEMENT PLAN

PANELS 201 - 202

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Acronyms and abbreviations

Acronym	Description
º	degree
AHD	Australian Height Datum
BFMP	Built Features Management Plan (this document)
CCC	Community Consultative Committee
CHPP	Coal Handling and Preparation Plant
DGS	Ditton Geotechnical Services
DPE	The NSW Department of Planning and Environment
DPE Water	The Water group within DPE
EA	Environmental Assessment
EPA	The NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPL	environment protection licence under the POEO Act
ha	hectare
HSE	health, safety and environment
IPSMP	Individual Property Subsidence Management Plan
IEA	Independent Environmental Audit
km	kilometre
LiDAR	light detection and ranging
LW	longwall panel
m	metre
ML	mining lease
mm	millimetre
mm/m	millimetre per metre
Mt	million tonnes
Mtpa	million tonnes per annum
NCOPL	Narrabri Coal Operations Pty Ltd
NSC	Narrabri Shire Council
NSW	New South Wales
PED	personal emergency device (communications system)
SoC	Statement of Commitments
ROM	run of mine
TARP	trigger action response plan
WHC	Whitehaven Coal Limited

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1. Introduction

1.1 Background

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

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

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

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

Modification 7, the most recent modification of the Project Approval, was approved on 23 November 2021. The environmental assessment for Modification 7 (Resource Strategies, 2021) (**MOD 7**) describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and instead allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205[2]. The bord and pillar mining will occur concurrently with longwall operations and is scheduled to commence in 2022 for a period of approximately five years. The maximum ROM coal production rate of the concurrent operation remains within the approved limit of 11 Mtpa.

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

The underground mining layout for Panels 201 to 202 is presented in Figure 1.1 and is further described in section 1.5.

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

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

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

LEGEND

— — Underground Mine Footprint

—E— Electricity Transmission Line (Constructed)

ONWARD CONSULTING

NARRABRI COAL MINE

Figure 1.1 : Underground Mining Layout for Panels 201 and 202

1.2 Purpose and scope

As required by Project Approval Schedule 6 Condition 2, this Built Features Management Plan (**BFMP**) for Panels 201 to 202 has been prepared in accordance with the NSW Department of Planning and Environment (**DPE**) *Draft Guidelines for the Preparation of Extraction Plans* (unpublished) (**Extraction Plan Guidelines**). It complies with Schedule 3 Condition 4(g) of the Project Approval, which states that, as part of the Extraction Plan, a BFMP is to be prepared to the satisfaction of the Resources Regulator to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings and which:

- addresses in appropriate detail all items of public infrastructure and all classes of other built features, as detailed in section 2.2; and
- has been prepared following appropriate consultation with the owner/s of potentially affected feature/s, as addressed in section 1.7.

This BFMP applies to built features that are considered likely to be adversely affected by subsidence associated with the secondary extraction of Panels 201 to 202. Its purpose is to ensure that impacts to these features are managed in accordance with the Project Approval, in particular the subsidence impact performance measures stipulated by Schedule 3 Condition 2 which require that:

- any infrastructure affected by subsidence will be always maintained as safe; and
- where possible, serviceability will be maintained and any loss of serviceability will be compensated. Damage will be fully repaired, or else replaced or fully compensated.

Subsidence predictions by Ditton Geotechnical Services (**DGS**) have been used as a basis for developing the performance measures, management actions and monitoring specified within this BFMP. The Subsidence Predictions Reports are provided, in full, as Appendix B to the Extraction Plan.

1.3 Objectives

The objective of the BFMP is to provide for the adequate management of built features within the Extraction Plan Area that will be potentially affected by subsidence. This objective will be achieved through:

- monitoring of subsidence and environmental consequences to:
  - confirm predicted impacts/consequences are within predicted ranges;
  - identify impacts or exceedances that require additional management or response; and
  - inform future subsidence prediction and consequence management;
- management of potentially affected features to:
  - mitigate potential consequences prior to subsidence occurring;
  - minimise the risk of service disruption to local residents and road users;
  - prevent personal injury; and
  - remediation of impacts following active subsidence;
- effectively communicating with potentially affected stakeholders;
- implementing appropriate contingency response measures in the event of adverse consequences or impacts outside predicted range; and
- implementing a process of reporting and review of subsidence management measures to allow for continual improvement.

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

1.4 Statutory requirements

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

1.4.1 Project Approval

Project Approval Schedule 3 Condition 2 requires NCOPL to ensure that the Narrabri Mine does not cause any exceedances of the performance measures as listed in Table 1.1, to the satisfaction of the Resources Regulator. Notes to this condition require NCOPL to define more detailed performance indicators for each of the performance measures, which are detailed in section 3.1. Public safety risks are (in part) addressed by some of the management measures proposed in this BFMP and are discussed and addressed specifically in the Public Safety Management Plan, provided as Appendix E to the Extraction Plan.

It is also noted that performance measure requirements do not prevent preventative or mitigatory actions being undertaken in order to achieve these objectives. Any compensation payable includes that which may be applicable under the *Coal Mine Subsidence Compensation Act 2017* (NSW) and/or the *Mining Act 1992* (NSW).

Table 1.1 - Subsidence impact performance measures

Subsidence impact 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	• No additional risk

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

Statement of Commitments

The Statement of Commitments for Site Operations and Management (**SoC**) is contained as Appendix 3 of the Project Approval. 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 2.1);
- monitoring of the effected property during mining (refer to section 3.2);
- timing for any remaining disconnection of services (refer to section 3.2); and
- post-mining inspection and reporting (refer to section 3.2 and section 4.2).

As the above commitments and requirements of an IPSMP have been addressed by this BFMP, IPSMPs will not be prepared for Panels 201 to 202.

1.4.2 EPBC approval

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

1.4.3 Mining lease

The original ML 1609 issued in 2008 has been amended to include a reference to Extraction Plans, removing the requirements for a Subsidence Management Plan. ML 1609 includes a number of requirements of relevance to the management of subsidence on built features, as listed in Table 1.2.

Table 1.2 - Relevant ML 1609 conditions

Mining Lease 1609 condition		BFMP reference
Condition	**Summary of the requirement**	
19	**Transmission lines, communications lines and pipelines** Operations must not interfere with or impair the stability or efficiency of any of these or any other utility on the mining lease area without the prior written approval of the Secretary, subject to any stipulated conditions.	Section 2.2.8
20	**Fences and gates** Activities on the lease must not interfere with or damage fences without the prior written approval of the owner or the Minister, subject to any stipulated conditions.	Section 3.1 Appendix 3
21	**Roads and tracks** Operations must not affect any road unless in accordance with an accepted MOP or the prior written approval of the Secretary. The lease holder is liable for any costs incurred by the appropriate road authority for fixing any damage to roads caused by operations.	Section 3.1 Appendix 3
28	**Trigonometrical stations and survey marks** A person must not remove, damage, destroy, displace, obliterate or deface any marks in connection with any trigonometrical station, permanent mark or survey mark unless authorised to do so by the Surveyor-General.	Section 3.1 Appendix 3

1.4.4 Extraction Plan Guidelines

As stated in the Extraction Plan Guidelines, the BFMP should give appropriate consideration to risk assessment and risk management. This is further addressed in section 1.6. The BFMP should also provide the details of the predicted damage, disturbance, access requirements or other inconvenience and the proposed management measures (e.g., acquisition, relocation, repair, alternative water supply, compensation and/or offsets) associated with mining and mine subsidence. These are further addressed in sections 2 and 3.

Further detail regarding how the requirements of the Extraction Plan Guidelines are addressed is provided in section 1.8 of the Extraction Plan.

1.5 Description of underground mining

The proposed layout of Panels 201 to 202 is shown in Figure 1.1. The five pillar reduction panels will be extracted from north to south and from east to west. The pillar reduction panels will have cover depths ranging from 177 to 212 m and widths ranging from 154 to 280 m. The panel lengths will range from 155 to 348 m. The lower Hoskissons Seam will be extracted with a nominal extraction height of approximately 4.3 m. A detailed description of the mine plan, anticipated extraction schedule, local geology, overburden and resource recovery is provided in the Coal Resource Recovery Plan, as Appendix A to the Extraction Plan.

1.5.1 Affected built features

The land within the Extraction Plan Area is exclusively owned by NCOPL and has historically been used for livestock grazing and occasional cereal cropping. Vegetation includes several of dense to scattered stands of Cypress pine, Casuarina (she-oak) and *Eucalyptus* (Box, redgum, ironbark). The Pilliga East State Forest covers the western areas of the ML.

Topographic relief above the proposed mining area ranges from 279 m Australian Height Datum (**AHD**) to 340 m AHD. The surface terrain is generally flat to gently undulating, with most slopes ranging from 1 to 5 degrees (º). Slopes increase to 10° to 35° in several rocky 'hillock' locations, including ephemeral creeks and tributaries (or gullies), which drain the Extraction Plan Area towards the north-east. The hillocks have Pilliga Sandstone exposures with local topographic relief and steep rocky slopes ranging between 10 and 15 m above the surrounding plains. The strata bedding generally dips towards the south-west to west at less than 5º.

Silty sand and sandy clay surface soils to 4 m depth are present in the Extraction Plan Area and are mildly to highly erosive/dispersive. The clayey soils are associated with the outcropping Garrawilla Volcanics and overlying Purlawaugh formation. Sandy alluvial deposits exist along the creek channels with no rock exposures present. The channels are typically incised with steep to very steep banks between 0.5 and 3.5 m high. Sub-surface groundwater aquifers at depths range from 5 to 50 m and are typically of poor quality.

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

- private roads and access tracks, including unsealed gravel access tracks;
- water storage dams (earth embankments) and associated soil conservation banks;
- property and livestock fences; and
- mine infrastructure, consisting of:
  - temporary surface to in-seam gas drainage wells and associated surface plant; and
  - personal emergency device (**PED**) cables.

Pit top infrastructure and the Kamilaroi Highway and Werris Creek to Mungindi Railway are greater than 1.9 km to the east of Panels 201 and 202 and is likely to be outside the limits of measurable far-field displacement and strain.

Predictions of subsidence impacts and potential consequences to the above built features are described in section 2.

It is to be noted that the Narrabri Mine is not located within a declared Mine Subsidence District under the *Coal Mine Subsidence Compensation Act 2017* (NSW).

1.6 Risk assessment

The Extraction Plan Guidelines state that appropriate consideration is to be given to risk assessment and risk management in the BFMP. This should include:

- the results of risk assessment conducted by a competent person in accordance with relevant standards and guidelines;
- a description of the investigation and analysis methods used in determining the risk control measures and procedures, carried out by a competent person;
- a description of all risk control measures and procedures, including a statement of the feasibility to manage identified risks; and
- a proposed program for implementation of the proposed risk control measures and procedures.

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

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

1.7 Consultation and approval

Apart from consultation with the community through the Narrabri Mine's Community Consultative Committee (**CCC**), this BFMP does not require any specific consultation. However, both Schedule 3 Condition 2 and Condition 4 contain requirement to the satisfaction of the Resources Regulator.

A draft (Revision B) of the BFMP was provided to the Resources Regulator on 3 December 2021. The Resources Regulator provided a response on 23 February 2022, with a single comment pertaining to powerlines and communication cables that pass across Panels 201-202. Note that the powerlines referenced in the comment are Narrabri Mine infrastructure, consisting of timber pole suspended domestic power supply and telecommunications lines.

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

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

1.8 Access to information

In accordance with Schedule 6 Condition 10 of the Project Approval, the approved Extraction Plan including 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 BFMP are uncontrolled.

2. Subsidence and environmental consequences

2.1 Subsidence predictions

The subsidence predictions for Panels 201 to 202 have been modelled and predictions updated, which includes using the measured levels for LW 101 to LW109. The subsidence effects (subsidence, tilt, curvature, horizontal displacements and strains) for the pillar reduction panels have been estimated based on published subsidence data for a broad range of coalfield geometries. Maximum predicted and observed subsidence values (worst-case scenarios) for extraction of these panels, as presented in Table 2.1, have been adopted for the purposes of this BFMP (DGS, 2021). Note that the predicted values may be occasionally exceeded (up to 5% of the time) due to discontinuous strata behaviour associated with near a, joint displacement, geological features (e.g. faults) and/or rapid changes in topography (creek beds).

Table 2.1 - Maximum subsidence predictions

Panel	Final maximum subsidence (S_{max}) (m)	Maximum tilt (mm/m)	Maximum tensile strain (mm/m)	Maximum compressive strain (mm/m)
CF 201-A	1.77	22	16	17
CF 201-B	1.77	21	14	15
CF 202-C	1.77	24	19	20
CF 202-D	1.77	32	27	29
CF 203-E	1.77	31	27	29
CF 203-F	1.77	23	18	19
CF 204-G	1.77	23	18	19
CF 204-H	1.77	32	27	29
CF 205-I	1.77	36	31	33
CF 205-J	1.77	22	16	17

Source: Table 7A and Table 7B in DGS (2021a).

2.2 Potential environmental consequences: built features

A brief description of built features likely to be affected by potential subsidence impacts and environmental consequences is provided in the following sections. Management actions have been developed for each of the identified built features asset groups and are detailed within individual tables in Attachment 3.

Predicted subsidence contours and the location of built features relative to the mine plan are shown in Plan 2, provided as Attachment 2 to the Extraction Plan.

2.2.1 Farm dams

There are five farm dams for livestock watering (D49, D65, D66, D67 and D68) that have been assessed in the Extraction Plan Area. The dams are nearly all located within the 20 mm subsidence contour from the proposed Panels 201 to 202.

Several farm dams have already been subsided by LW 101 to 109 but have not required remedial works to be undertaken. Notwithstanding, 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 Extraction Plan Area dams (before remediation is required) will depend upon the dam wall materials, construction techniques, and foundation type. The expected phases of tensile and compressive strain development may result in breaching of the dam walls or water losses through the floor of the dam storage areas. Loss or increase of storage areas may also occur due to the predicted tilting. Maximum tensile crack widths across dam wall or storage areas are estimated to range between 30 and 400 mm. Two farm dams (D67 bd D68) above CF 203 may be inundated by post-mining ponding. The likely subsidence effects at the dams above each of the panels are summarised in Table 19 of the Subsidence Predictions Report, provided as Appendix B to the Extraction Plan.

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

2.2.2 Soil conservation banks

A number of contour banks exist across the area covered by 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.

2.2.3 Access roads and tracks

The unsealed gravel access roads and tracks above Panels 201 to 202 are likely to be damaged by cracking and respective shearing or heaving in the tensile or compressive strain zones. Maximum tensile crack widths across or along roads are estimated to range between 50 and 300 mm. Surface ‘steps’ or humps due to compressive shear failures are estimated to range between 30 and 320 mm and are likely to reduce the safe trafficability of all unsealed access roads, and impact the effectiveness of any longitudinal drainage (i.e. swales) or transverse pipe culverts that may be present. Some sections of road may require regrading or drainage remediation works after subsidence development.

The likely subsidence effect predictions for access roads and tracks are summarised in Table 20 of the Subsidence Predictions Report, which is provided as Appendix B to the Extraction Plan.

2.2.4 Property and livestock fences

The fence lines and grazing areas above Panels 201 to 202 are predicted to be subjected to the maximum predicted subsidence tilt of between 0 to 28 mm/m. Impact to fences is likely to include the following:

- 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.

The above impacts would potentially lead to the escape of livestock onto public roads, and may hinder movement across the property if gates won't readily open.

2.2.5 Residential dwellings and sheds

'Moderate' to 'significant' damage to existing buildings and tanks are likely where tilts exceed 7 mm/m and tensile or compressive strains exceed 4 mm/m (DGS, 2021). The severity of the damage would also be dependent on the type and geometry of each structure and whether localised 'humps' and 'troughs' develop over the goaf as it consolidates.

There are no dwellings or sheds located above the proposed Panels 201 and 202.

2.2.6 Mine infrastructure

There are no water supply wells or groundwater monitoring bores installed or located within the Extraction Plan Area over Panels 201-202.

2.2.7 Survey control marks

One State survey mark (SS 39336) is located within the Extraction Plan Area, which will likely be subsided approximately 0.01 m during the extraction of Panels 201 to 202. In accordance with the requirements of the *Surveying and Spatial Information Act 2002* (NSW) and ML 1609:

- approval has been obtained from the NSW Surveyor General under Clause 90 of the Surveying and Spatial Information Regulation 2017 (NSW) prior to damaging the survey mark under Section 24 of the Act. The Survey Mark Removal (SMR) Application (reference SO-738) was granted on 29 October 2021; and
- following subsidence, the functionality of the survey mark will be restored to the satisfaction of the NSW Surveyor General.

More details on the State survey marks located in the vicinity and within the Extraction Plan Area, including coordinates, are presented in Table 27 of the Subsidence Predictions Report, provided as Appendix B to the Extraction Plan.

2.2.8 Utility infrastructure

No public utility infrastructure exists within the Extraction Plan area above Panels 201 to 202.

2.2.9 Other rural infrastructure

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

3. Subsidence management

3.1 Performance measures and indicators

General performance measures for built features are defined under Project Approval Schedule 3 Condition 2, and have previously been reproduced in Table 1.1. NCOPL will ensure that:

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

Additional, specific performance indicators for individual built features have been developed and are listed in Table 3.1.

Table 3.1 - Built features performance measures

Feature	Performance measure / indicator
Roads and access tracks	
Roads (all)	Access to and within ML 1609 is maintained
Culverts	All culverts are fully functional after active subsidence
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
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	
Farm buildings 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
Mine infrastructure	
SIS gas drainage infrastructure	Decommissioned and made safe prior to being affected by subsidence
Surface gas pipelines	No impact anticipated
PED cable	Design/install PED cable to avoid subsidence impacts
Survey marks	
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

3.2 Subsidence monitoring and management

The built features managed under the scope of this BFMP have been grouped into the following asset groupings:

- roads and access tracks;
- dams, including windmills, and soils conservation banks;
- property and livestock fences;
- residential dwellings and machinery sheds; and
- mine infrastructure.

Detailed subsidence monitoring and management actions have been developed for each of the identified built features asset groups and are detailed within individual tables in Attachment 3. Based on the conclusions in the Subsidence Predictions Report, provided as Appendix B to the Extraction Plan, each management table includes specific actions for the mitigation of subsidence impacts categorised into:

- monitoring;
- management; and
- notification and consultation.

3.3 Incident and contingency response

A general procedure for contingency responses for an exceedance of any performance measures under the Extraction Plan is described in section 4.3 of the Extraction Plan.

Potential risks and controls associated with subsidence of affected built features were identified as part of a risk assessment, as described in section 1.6. A trigger action response plan (**TARP**) for all of the asset groups and foreseeable potential incidents identified under this BFMP is presented in Attachment 4. In particular, more detailed contingency response procedures for undertaking road repairs are outlined in Attachment 5.

4. Plan implementation

4.1 Roles and responsibilities

To ensure adequate implementation of this management plan and the associated monitoring, the following responsibilities have been assigned to relevant NCOPL personnel (see Table 4.1). Further details on the various responsibilities are provided in Attachment 3. It is also noted that additional responsibilities are referred to within the Extraction Plan and the appended sub-plans.

Table 4.1 - Roles and responsibilities

Roles	Responsibilities
General Manager	• Ensure that adequate resources are available to NCOPL personnel to facilitate the completion of their responsibilities under this program.
Mine Manager	• Ensure the subsidence monitoring program is implemented and adhered to.
Environmental Superintendent	• Ensure that all monitoring and reporting under the BFMPs and Subsidence Monitoring Program is carried out within the timeframes specified, and is checked, processed and filed appropriately.
	• Liaise with stakeholders regarding subsidence impact management.
	• Authorise changes to this BFMP.
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
Surface Operations Manager	• Provides notification to all mine personnel advising of potential subsidence hazards and impacts • Undertakes inspections of potentially affected buildings
Technical Services Manager	• Decommissions SIS drainage sites and structures prior to subsidence impacts
Registered Mine Surveyor	• Ensure that all subsidence monitoring is carried out to the accuracy required, within specified timeframes and are checked, processed and filed appropriately.

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

5. Reporting, evaluation and review

5.1 Annual Review

In accordance with Schedule 6 Condition 6, NCOPL will review the subsidence impact performance 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 all 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 the subsidence impact management process.

The Annual Review will be available on the WHC website.

5.2 Independent environmental audits

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

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

5.3 Management plan review and evaluation

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

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

NCOPL will the review, and if necessary, revise this 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. The review history table in the front of this Plan provides the details of each review.

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

6. Incidents and non-compliance

6.1 Incident notification

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

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

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

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

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

6.2 Non-compliance notification

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

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

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

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

7. Complaints management

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

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

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

As per Schedule 3 Condition 3, any dispute between the Narrabri Mine and the owner(s) of any built feature affected by mining over the interpretation, application or implementation of the performance measures in Table 1.1 will be settled by the Resources Regulator. The Resources Regulator may seek the advice of Subsidence Advisory NSW (formerly the Mine Subsidence Board) on the matter. Any decision by the Resources Regulator will be final and not subject to further dispute resolution.

8. References

Alt S., Jenkins A., Lines-Kelly, R. (2009) *Saving Soil - A landholder's guide to preventing and repairing soil erosion*. Published by the NSW Department of Primary Industries.

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

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

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

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

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

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

9. Glossary

Term	Definition
Angle of draw	The angle between the vertical and the line joining the edge of the mining void with the limit of vertical subsidence, usually taken as 20mm.
Chain pillar	The pillar(s) of coal left between adjacent longwall panels. This forms a barrier that allows the goaf to be sealed off and facilitates tailgate roof stability.
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).
Council	Narrabri Shire Council
Cover depth	The depth of coal seam from the ground surface (metres).
Department	The NSW Department of Planning and Environment (DPE)
Environmental consequences	The environmental consequences of subsidence impacts including: damage to built features; loss of surface flows to the subsurface; loss of standing pools; adverse water quality impacts; development of iron bacterial mats; cliff falls; rock falls; damage to Aboriginal heritage sites; impacts to aquatic ecology; ponding.
Extraction Plan Area	The surface area predicted to be affected by the proposed secondary extraction of Panels 201 to 202
Far-field subsidence	Mining-induced movements of the ground surface in areas where vertical subsidence is less than 20mm.
First workings	Development headings created by a continuous mining machine - designed to remain stable during development and longwall extraction. Provide ventilation and services, access for staff and materials, and allow for transportation of raw coal out of the mine (i.e. also referred to as mains headings, gate roads, maingate, tailgate).
Goaf	The mined-out area into which the immediate roof strata breaks.
Groundwater	Water contained in the interconnected pore spaces and voids of the saturated zone of sediments and rocks.
Incident	An occurrence or set of circumstances that causes or threatens to cause material harm and which may or may not be or cause a non-compliance
Material harm	Material harm to the environment is defined in section 147 of the POEO Act
Minimise	Implement all reasonable and feasible mitigation measures to reduce the impacts of the Narrabri Mine
MOD 5	Reduced the number of longwall panels from 26 to 20; increased the longwall panel widths for LW 107 to LW 120 from approximately 295 m to approximately 400 m; extended the western footprint approximately 60 m; and increased the maximum ROM coal processing rate from 8 Mtpa to 11 Mtpa.
MOD 7	Describes the change in mining method within the extent of the previously approved LW 201 and LW 202 and allows for up to 0.7 Mtpa via bord and pillar extraction at pillar reduction panels CF 201 to CF 205
Panels 201 to 202	Pillar reduction panels CF 201 to CF 205
Planning Secretary	Planning Secretary under the EP&A Act, or nominee
Pollution incident	Has the same meaning as in the POEO Act
Project Approval	Development consent (DA_08_0144) issued on 26th July 2010 under Section 75J of the Environmental Planning and Assessment Act 1979 by the Department of Planning & Infrastructure (as modified).

Term	Definition
Second workings	Extraction of coal from longwall panels, mini-wall panels, or pillar extraction.
Subsidence	The totality of subsidence effects, subsidence impacts and environmental consequences of subsidence impacts.
Subsidence effects	Deformation of the ground mass due to mining, including all mining-induced ground movements, including both vertical and horizontal displacement, tilt, strain and curvature.
Subsidence impacts	Physical changes to the ground and its surface caused by subsidence effects, including tensile and shear cracking of the rock mass, localised buckling of strata caused by valley closure and upsidence and surface depressions or troughs.
Rehabilitation	The restoration of land disturbed by the development to ensure it is safe, stable and non-polluting over the short, medium and long term
Unacceptable risk	The level of risk at which mitigation actions are deemed to be warranted.
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

Attachment 1 Compliance conditions relevant to the BFMP

Table A1.1 - Relevant Project Approval 08_0144 requirements

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
Schedule 2 Condition 1	The Proponent shall implement all practicable measures to prevent and/or minimise any harm to the environment that may result from the construction, operation, or rehabilitation of the project.	Section 1.3
Schedule 2 Condition 11	With the approval of the Secretary, the Proponent may submit any management plan or monitoring program required by this approval on a progressive basis. ***Note**: The conditions of this approval require certain strategies, plans, and programs to be prepared for the project. They also require these documents to be reviewed and audited on a regular basis to ensure they remain effective. However, in some instances, it will not be necessary or practicable to prepare these documents for the whole project at any one time, particularly as these documents are intended to be dynamic and improved over time. Consequently, the documents may be prepared and implemented on a progressive basis, subject to the conditions of this approval. In doing this however, the Proponent will need to demonstrate that it has suitable documents in place to manage the existing operations of the project.*	There is no staging for the BFMP for Panels 201-202
Schedule 3 Condition 2	The Proponent shall ensure that the project does not cause any exceedances of the performance measures in Table 2, to the satisfaction of Resources Regulator.	Section 3.1
	Table 2: Subsidence impact 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: • No additional risk	
	***Notes**:* *1) The Proponent will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans or Public Safety Management Plan (see Schedule 3 Condition 4 below).* *2) Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes.* *3) Compensation required under this condition includes any compensation payable under the Mine Subsidence Compensation Act 1961 and/or the Mining Act 1992.*	Section 3.1 Refer also to the PSMP

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
Schedule 3 Condition 3	Any dispute between the Proponent and the owner of any built feature over the interpretation, application or implementation of the performance measures in Table 2 is to be settled by the Resources Regulator. The Resources Regulator may seek the advice of the MSB on the matter. Any decision by the Resources Regulator shall be final and not subject to further dispute resolution under this approval.	Section 7
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:	This Plan
	• addresses in appropriate detail all items of public infrastructure and all classes of other built features; and	Section 2.2.8
	• has been prepared following appropriate consultation with the owner/s of potentially affected feature/s;	Section 2.2
Schedule 6, Condition 2	The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	
	(a) detailed baseline data;	Section 1.5
	(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 1.4
	• the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the project or any management measures	Section 1.4.1
	(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria:	Section 3.1
	(d) a program to monitor and report on the:	
	• impacts and environmental performance of the project;	Section 3.2
	• effectiveness of any management measures (see (c) above);	Attachment 3
	(e) a contingency plan to manage any unpredicted impacts and their consequences;	Attachment 4
	(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Section 5.3
	(g) a protocol for managing and reporting any;	
	• incidents;	Section 6.1
	• complaints;	Section 7
	• non-compliances with statutory requirements; and	Section 6.2

Project Approval 08_0144 conditions		Document reference
Condition	**Requirement**	
	• exceedances of the impact assessment criteria and/or performance criteria; and	
	(h) a protocol for periodic review of the plan.	Section 5
Schedule 6 Condition 3	Within 3 months of the submission of an:	Section 5.3
	(a) audit under condition 7 of Schedule 6;	
	(b) incident report under condition 4 of Schedule 6; and	
	(c) annual review under condition 5 of Schedule 6; and	
	(d) any modification to the conditions of this approval (unless the conditions require otherwise),	
	the Proponent shall review, and if necessary revise, the strategies, plans, and programs required under this approval to the satisfaction of the Secretary.	
Schedule 6 Condition 4	The Proponent shall notify the Secretary in writing via the Major Projects website and any other relevant agencies of any incident associated with the project as soon as practicable after the Proponent becomes aware of the incident. Within 7 days of the date of the incident, the Proponent shall provide the Secretary and any relevant agencies with a detailed report on the incident.	Section 6.1
Schedule 6 Condition 5	The Proponent shall provide regular reporting on the environmental performance of the project on its website, in accordance with the reporting arrangements in any plans or programs approved under the conditions of this approval, and to the satisfaction of the Secretary.	Section 5
Schedule 6 Condition 6	By the end of March each year, the Proponent must submit a review of the environmental performance of the project for the previous calendar year to the satisfaction of the Secretary.	Section 5.1
Schedule 6 Condition 7	Prior to 13 September 2010, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project (Stages 1 and 2).	Section 5.2
Schedule 6 Condition 10	The Proponent shall: (a) make copies of the following publicly available on its website: • the documents referred to in Condition 2 of Schedule 2; • all current statutory approvals for the project; • all approved strategies, plans and programs required under the conditions of this approval; • a comprehensive summary of the monitoring results of the project, reported in accordance with the specifications in any conditions of this approval, or any approved plans and programs; • a complaints register, updated on a monthly basis; • minutes of CCC meetings; • the annual reviews of the project; • any independent environmental audit of the project, and the Proponent's response to the recommendations in any audit; • any other matter required by the Secretary; and	Section 1.8
	(b) keep this information up-to-date, to the satisfaction of the Secretary.	Section 1.8

Attachment 2 Consultation records

NSW GOVERNMENT | Regional NSW

DOC RVF22/403#1
MAAG0013080

Mr Brent Baker
NCO-approval@whitehavencoal.com.au

Via: Major Project Portal / Email

Dear Mr Baker,

Re. Extraction Plan – Narrabri Coal Stage 2

I refer to your request of 3 December 2021 for advice regarding the Narrabri Coal Stage 2 – Extraction Plan. The Resources Regulator has reviewed the request.

Assessment
Based on the review of the Extraction Plan, the variations to the extraction plan and subsidence monitoring program satisfies Condition 8 of Mining Authorisation Number ML1609, and Condition 4 of the Extraction Plan condition in the development consent.

However, the extraction plan consists of a change in mining method (herringbone) which will introduce new hazards requiring new controls. This will be further assessed with when Narrabri coal submit a secondary extraction HRA application.

Based on the information provided the mine operator has developed the management plans required by the Project Approval Condition 4(g).

However, there appears to be powerlines and communication cables that pass across the northern periphery of the panels in question and which would be in the area of subsidence affectation that are not addressed in the Built Features Management Plan. It is not clear from the information provided if this is mine infrastructure. This issue needs to be brought to the attention of DPIE.

The proposed mining will be regulated in relation to subsidence WHS risks under relevant WHS law, in particular as a High Risk Activity notification under Clause 33 and Schedule 3 Clause 16(3)(e) of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014.

Limitations
The Extraction Plan is assessed and determined by DPIE under the conditions of the development consent. The Resources Regulator provides advice to DPIE to assist in the determination.

516 High Street MAITLAND NSW 2320 Australia | PO Box 344 HRMC NSW 2310 Australia |Tel: +612 4931 6666

Regulatory requirements if approved

The authorisation holder is required to ensure that the rehabilitation commitments outlined in any approved Extraction Plan are included in the Mining Operations Plan / Rehabilitation Management Plan regulated by the Resources Regulator under the conditions of the mining lease and the *Mining Act 1992*. The authorisation holder must ensure the Mining Operations Plan / Rehabilitation Management Plan for the area covered by this Extraction Plan is updated where necessary.

The Resources Regulator may undertake assessments of the mine operators' proposed mining activities under the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and Regulation as well as other WHS regulatory obligations.

Subsidence associated with the proposed Extraction Plan will be regulated by under relevant provisions of WHS laws in particular Clause 33 and Clause 67 of the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* relating to High Risk Activities and Subsidence.

Background

The NSW Resources Regulator is responsible for compliance and enforcement of the Extraction Plan is so far as it relates to requirements under the Mining Act 1992 and Work Health and Safety legislation. This role principally relates to rehabilitation, workplace safety and public safety.

The Mining Act Inspectorate within the Resources Regulator undertake risk-based compliance and enforcement activities in relation to obligations under the *Mining Act 1992*. This includes undertaking assessment and compliance activities in relation to mine rehabilitation activities and determination of security deposits.

The Mine Safety Inspectorate within the Resources Regulator is responsible for ensuring the mine operators' compliance with the Work Health and Safety (WHS) legislation, in particular the effective management of risks associated with the principal hazards as specified in the *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*.

Contact

Should you require any further information or clarification, please contact the Office of the Executive Director (ED.ResourcesRegulator@planning.nsw.gov.au)

Yours sincerely,

Peter Day
Executive Director
Resources Regulator

23 February 2022

Table A2.1 - Built Features Management Plan (Draft Revision B) - comments reconciliation

Resources Regulator comments

Item	Section #	Section heading	Existing text / explanation	Comment / recommendation	Response
1	N/A	N/A	No specific text reference	Based on the information provided the mine operator has developed the management plans required by the Project Approval Condition 4(g). However, there appears to be powerlines and communication cables that pass across the northern periphery of the panels in question and which would be in the area of subsidence affectation that are not addressed in the Built Features Management Plan. It is not clear from the information provided if this is mine infrastructure. This issue needs to be brought to the attention of the DPE.	The referenced powerlines are Narrabri Mine infrastructure, consisting of timber pole suspended domestic power supply and telecommunications lines.

Attachment 3 Built features management

Table A3.1 - Management of roads and access tracks

Roads and access tracks				
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-needs basis (access tracks and roads are used daily by mine personnel).	Environment Superintendent / Civil Services Coordinator	Document internally – see checklist template 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	Grade road(s) during active subsidence to temporarily remediate subsidence impacts to the road surface and to maintain traffic ability (refer to Attachment 4).	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.
3	**Notification, consultation and reporting**			
3.1	Provide written notification (e.g. Toolbox Talks) 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.	Annually.	Surface Operations Manager	Document internally

Table A3.2 - Management of water storage dams and soil conservation contour banks

Water storage dams 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. 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 noting their condition and any changes in accordance with the Subsidence Monitoring Program.	Daily during undermining of structure.	Environment Superintendent	Document internally.
2	**Management**			
2.1	Maintain safe access to the water storage dams and contour banks to allow for personnel to undertake inspection, maintenance and remediation works (if required).	Ongoing.	Civil Services Coordinator	Document internally.
2.2	Assess each dam prior to undermining to determine need to drain (fully or partially) each dam 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 undermining until assessment and repairs are completed (i.e. excess water pumped out following rainfall).	Complete assessments prior to undermining, 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 undermining.	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 undermining.	Environment Superintendent	Annual review

Water storage dams and soil conservation contour banks				
Item	**Action**	**Trigger / timing**	**Responsibility**	**Reporting**
3	**Notification, consultation and reporting**			
3.1	None proposed for Panels 201 to 202.			

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 / 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 area noting their condition and functionality.	On an as needs basis.	Environment Superintendent	Document internally.
2	**Management**			
2.1	Exclude stock from areas of active subsidence 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 for Panels 201 to 202.			

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	All habitable buildings will be vacated prior to subsidence impacts occurring. These buildings and surrounding area will then be secured to prevent unauthorised access or use, and minimise risk of personal injury.	Prior to undermining.	Surface Operations Manager	Document internally.
2.2	Entry to all farm machinery and storage sheds will be restricted prior to and throughout active subsidence.	Prior to undermining.	Surface Operations Manager	Document internally.
2.3	Services to subsidence-affected buildings to be disconnected.	Prior to undermining.	Surface Operations Manager	Document internally.
2.4	Septic tank(s) will be pumped out and effluent disposed of to an appropriately licensed treatment facility prior to subsidence to prevent unplanned release of effluent due tank damage.	Prior to undermining.	Surface Operations Manager	Document internally.
2.5	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.
2.6	Buildings affected by subsidence will remain secured to prevent unauthorised access until such time as they are structurally assessed, demolished or repaired.	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 for Panels 201 to 202.			

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 undermining and following completion of subsidence.	Technical Services Manager	Document internally.
1.2	Survey collars of all affected piezometers and groundwater monitoring bores to confirm accurate levels for monitoring of groundwater	Prior to and following completion of subsidence.	Environmental Superintendent	Document internally and inform groundwater monitoring personnel of any RL changes.
2	**Management**			
2.1	Decommission SIS gas drainage sites prior to impact by subsidence	Prior to undermining.	Technical Services Manager	Document internally.
2.2	Continue to monitor subsidence affected groundwater piezometers following subsidence (note: life-of-mine network installed outside of Extraction Plan Area to monitor impacts)	Ongoing.	Environmental Superintendent	Document internally.
2.3	Design and install PED cable with enough ‘slack’ for subsidence-related impacts	Prior to undermining.	Civil Services Coordinator	Document internally.
3	**Notification, consultation and reporting**			
3.1	None proposed for Panels 201 to 202.			

Table A3.6 - Management of survey marks

Survey marks				
Item	**Action**	**Trigger/Timing**	**Responsibility**	**Reporting**
1	**Monitoring**			
1.1	Approval to be sought from the Surveyor General prior to removing, damaging, destroying, obliterating or defacing any survey marks.	Application must be made at least 14 days prior to impacts.	Registered Mine Surveyor	Notify Surveyor General.
2	**Management**			
2.1	Once undermined, restore the survey mark and submit the updated details to the Surveyor General	After subsidence is practically complete (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 Trigger action response plan

Table A4.1 - Trigger action response plan

Monitoring	Trigger	Action
Roads and access tracks		
To note any subsidence impacts that require remediation or implementation of additional traffic controls **Sites** Visual monitoring of affected roads and tracks. **Parameters** Note any damage to roads that may cause traffic hazard (i.e. cracks, compression humps, ponded water on road surface) **Analysis:** Visual identification, refer to road management response tables in Attachment 5. **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.	• 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 5).
	Level 2 If vehicle accident occurs	• 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 BFMP and revise accordingly if required.
Water storage dams and soil conservation banks		
Condition		
To document pre- and post-subsidence condition and allow identification of required remedial works **Sites:** All dams **Parameters** Obtain xyz coordinates along of water storage dam embankments/spillways and along contour banks. Photographic records. **Analysis:** Pre- and post-mining comparison **Frequency:** Pre and post-subsidence	**Level 1** Post-subsidence survey identifies that spillway and dam wall not likely to operate as intended (i.e. spillway no longer lowest point on wall) or Post-subsidence survey identifies that contour bank not likely to operate as intended (i.e. damaged due to cracking, areas no longer able to drain, or lengths with increased slope).	• Notify Environmental Superintendent. • Reduce stored water level (if not already reduced), assess and undertake repairs to wall or spillway as required (see Attachment 3) • Reconstruct or repair as per Attachment 3.
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.	• Notify Environmental Superintendent. • Continue to monitor.
	Level 2 Sudden drop in water level noted that 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.	• As for Level 1 • Restrict access to the area • Reduce stored water level by pumping water out (release downstream) and maintain lowered water level until post-subsidence assessment and repairs can be carried out.
Property and livestock fences		
To note the condition and functionality of affected fences to ensure effective exclusion of stock from active subsidence area. **Sites**: All panels (LW107-LW110) **Parameters**: Visual inspections of fences and gates/cattle grids within active subsidence area **Analysis**: Visual observation **Frequency**: On an as needs basis	**Level 1** Damage observed to fences that can be attributed to subsidence movements.	• Notify Environmental Superintendent. • Undertake repairs as per Attachment 3

Monitoring	Trigger	Action
Residential dwellings and machinery sheds		
Harmful substances		
To identify presence of potentially harmful substances that may be released as a consequence of subsidence **Sites**: All subsidence-affected buildings and structures **Parameters**: Hazardous materials (i.e. asbestos) identification survey **Analysis**: - **Frequency**: Prior to subsidence	**Level 1** Survey reveals presence of asbestos or other hazardous material within the buildings or surrounds and that is considered a potential risk to the environment in the event of subsidence damage.	• Notify Surface Operations Manager. • Remove or 'make safe' (demarcate) any potentially hazardous building materials that would potentially pose a health or environmental threat as a result of subsidence impacts (i.e. damage to asbestos) prior to subsidence impacts.
Post-subsidence condition		
To assess post-subsidence condition of structure and determine if repair is practicable, cost-effective and safe **Sites**: All subsidence-affected buildings and structures **Parameters**: Post-subsidence structural assessment **Analysis**: - **Frequency**: Post subsidence	**Level 1** Structure collapses or is considered to be uneconomic to repair.	• 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.	• 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.	• Notify Technical Services Manager / Civil Services Coordinator. • Inspect to locate site of damage and replace or repair as required.
Survey Marks		
Pre- and post-mining notifications for impacts.	**Level 1** Notify of impacts to survey marks 14 days prior to impacts.	• Registered Surveyor to update details following mining.

Attachment 5 Road inspections and response

Road and track inspections

As nominated in Table A2.1 in Attachment 2, 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 A4.1 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 A5.1 - Road impact table

Impact	Full road width	Half road width	Road edge
Cracking > 100 mm wide	HIGH	HIGH	MODERATE
Cracking 20 – 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 guidelines as presented in Table A4.2 will be implemented, noting that individual circumstances may require deviation from the following action. The order of priority for any contingency response under this Plan will be:

1. ensure the safety of mine personnel;
2. minimise the duration of inconvenience or disruption; and
3. repair in accordance with the level of impact (high, medium, or low) as identified in the table below.

Table A5.2 - 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 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 A4.1)
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:	