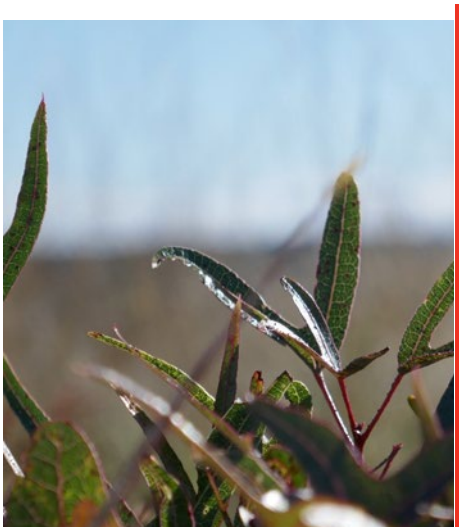


UG4 LONGWALLS 401 TO 408 PUBLIC SAFETY MANAGEMENT PLAN

Document	Version	Issue	Effective	Author	Approved
MCO_UG4_LW401-408_PSMP	1	June 22	July 22	MCO	B. Wesley

Version	Issue Date	Approval Date	Description	Author(s)	Review Team
1	June 2022	July 2022	Approved	MCO	MCO

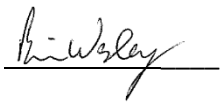
Approved:  Date: 15/07/2022

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The Moolarben Coal Complex is an open cut and underground coal mining operation located approximately 40 kilometres north of Mudgee in the Western Coalfield of New South Wales (NSW) (**Figure 1**).

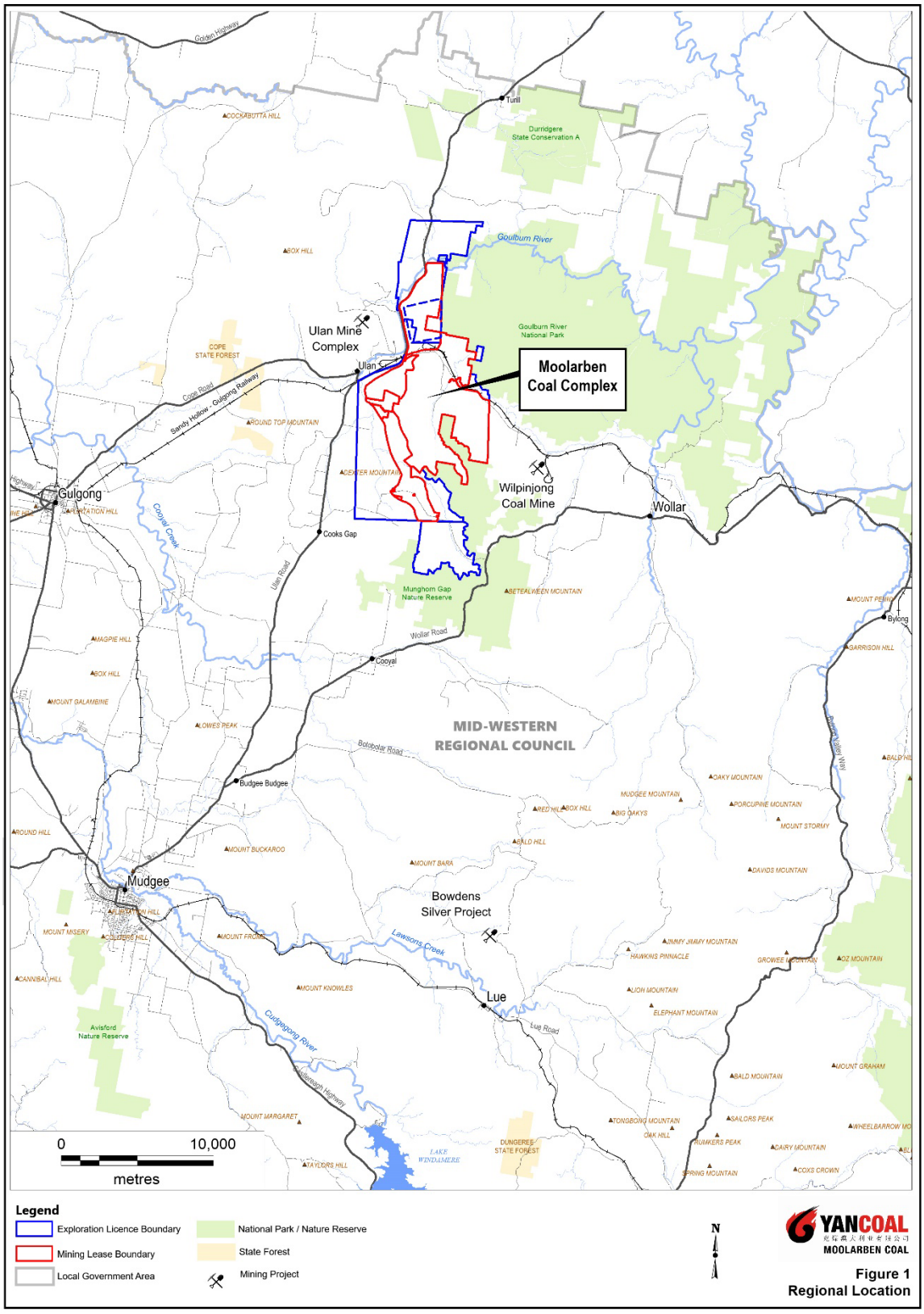
Moolarben Coal Operations Pty Ltd (MCO) is the operator of the Moolarben Coal Complex on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd [MCM], Yancoal Moolarben [YM] Pty Ltd and a consortium of Korean power companies). MCO, MCM and YM are wholly owned subsidiaries of Yancoal Australia Limited.

The Moolarben Coal Complex comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities) (**Figure 2**). Since the commencement of coal mining operations in 2010, mining activities have occurred within OC1, OC2, OC4 and UG1 (**Figure 2**).

The UG4 Underground Mine (UG4) is a component of the approved Moolarben Coal Project Stage 1 Approval (05_0117) (**Figure 2**). First workings for UG4 North Mains commenced in October 2020 (**Figure 3**). Secondary extraction in UG4 of the first Longwall LW401 is scheduled to commence in 2022 (Table 2).

Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038 and would continue to be carried out in accordance with Project Approval (05_0117) (Moolarben Coal Project Stage 1) as modified and Project Approval (08_0135) (Moolarben Coal Project Stage 2) as modified, granted under the NSW Environmental Planning and Assessment Act, 1979 (EP&A Act).

Figure 1 Regional Location



Document	Version	Issue	Effective	Author	Approved
MCO_UG41_LW401-408_PSMP	1	June 22	July 22	MCO	B. Wesley

Figure 2 Moolarben Coal Complex Layout

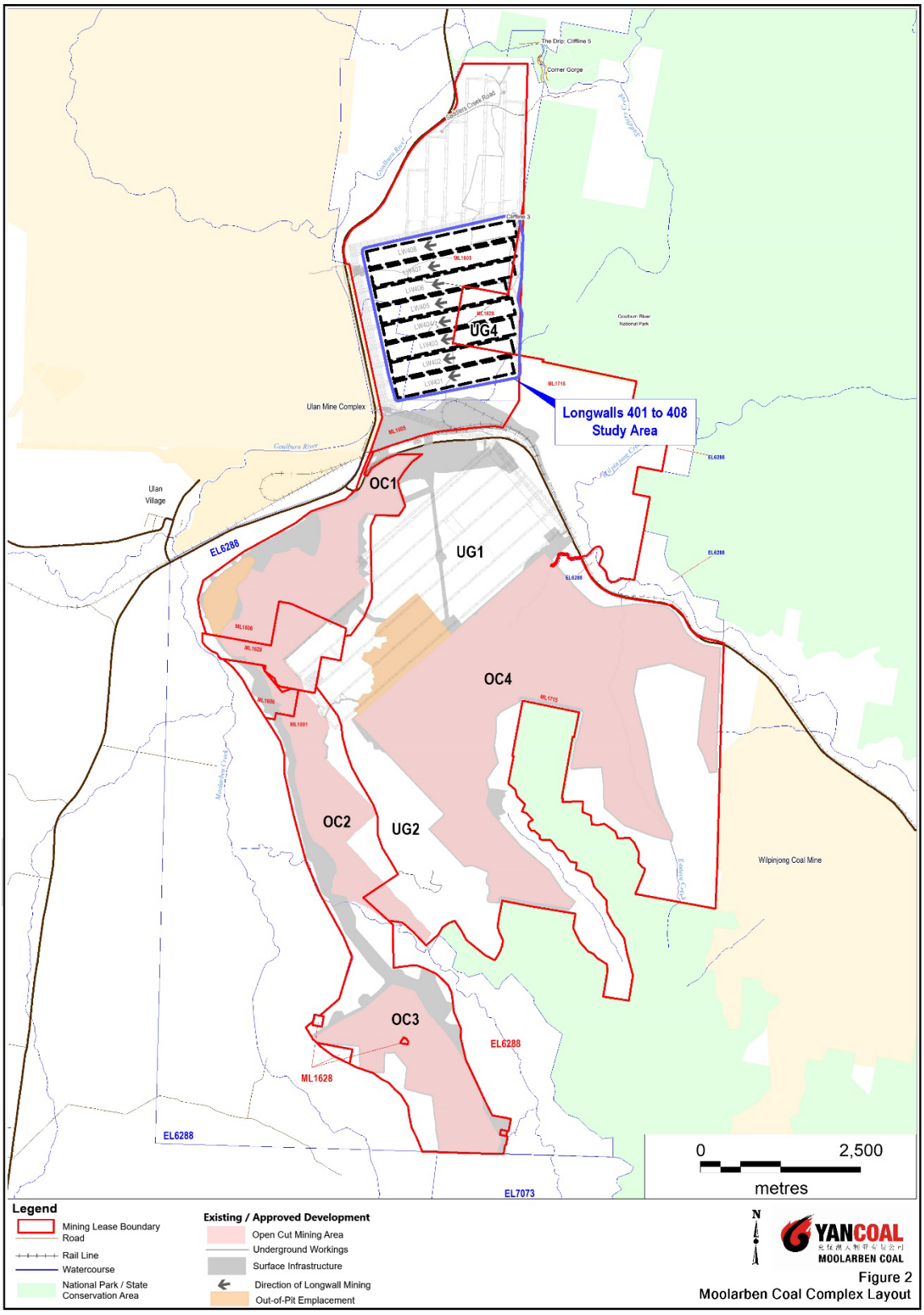
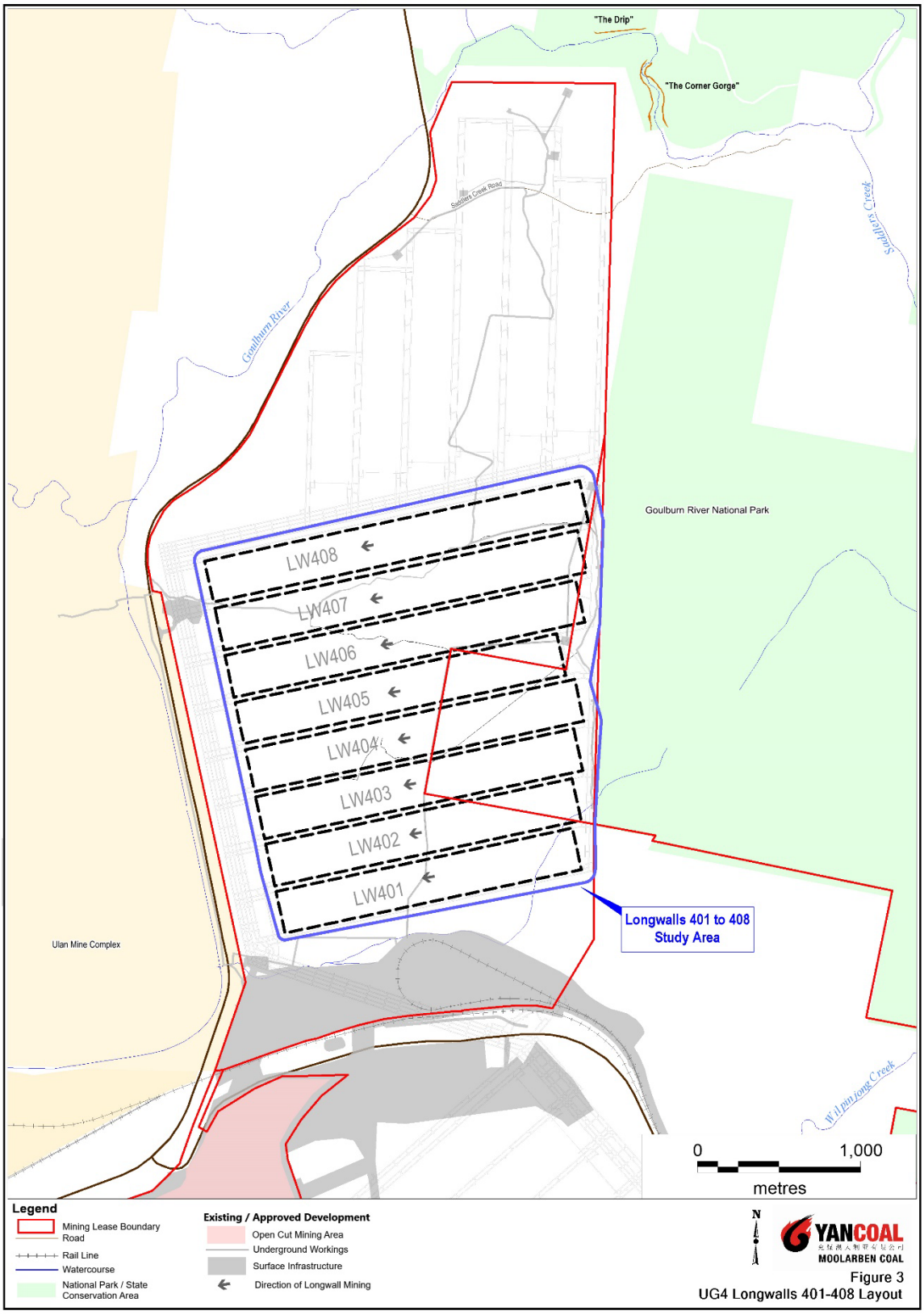


Figure 3 Underground Mine 4 Longwalls 401 to 408 Layout



1.1 PURPOSE AND SCOPE

This UG4 Longwalls 401 to 408 Public Safety Management Plan (LW401-408 PSMP) forms a part of the Extraction Plan being developed for Longwalls 401 to 408 (herein referred to as Longwalls 401-408) of the approved UG4 Underground Mine. This LW401-408 PSMP has been prepared by MCO, with input from Mine Subsidence Engineering Consultants [MSEC], to satisfy the requirements of Project Approval (05_0117) as modified and the NSW Department of Planning, Industry and Environment (DPIE) and NSW Division of Resources and Energy (DRE) (2015) draft *Guidelines for the Preparation of Extraction Plans*. The appointment of the team of suitably qualified and experienced persons (which includes representatives of MCO and MSEC) was endorsed by the Secretary of the DPIE on the 26 April 2021 (Attachment 2 of the Extraction Plan).

Purpose: This LW401-408 PSMP outlines the management of potential consequences on public safety resulting from the extraction of Longwalls 401- 408.

Scope: This LW401-408 PSMP covers MCO land within Longwalls 401-408 Study Area[1] (**Figure 3**) and non-MCO land in the vicinity of Longwalls 401-408 Study Area (**Figure 5**).

Longwalls 401- 408 form the UG4 Underground Mine at the Moolarben Coal Complex.

Dronvisa Quarry is the only privately-owned built feature within the Study Area. All public utilities and other privately-owned built features are located outside of the Study Area. The operators of the Dronvisa Quarry are responsible for restricting public access onto their mining lease areas. Access to the Dronvisa Quarry will be in accordance with their operating procedures.

With regards to safety from subsidence related impacts, owners of public utilities and privately owned built features on land outside and within the Longwalls 401- 408 Study Area have been consulted with separately as part of the UG4 Longwalls 401 to 408 Built Features Management Plans (LW401-408 BFMPs); including Essential Energy (EE), TransGrid, Mid-Western Regional Council (MWRC), Telstra, Australian Rail Track Corporation (ARTC), Ulan Coal Mines Pty Limited (UCMPL) and Dronvisa Quarry (Dronvisa). A list of the key responsibilities of MCO personnel in relation to this LW401-408 PSMP, and a list of key contacts, is provided in **Section 11**.

1.1.1 Longwalls 401-408 Study Area

The Study Area has been defined (**Figure 3** and **Figure 4**), as a minimum, as the surface area enclosed by a 26.5° angle of draw line from the extents of secondary extraction and by the predicted total 20 mm subsidence contour based on the Extraction Plan Layout and Approved Layout. Other features which could be subjected to far-field or valley related movements and could be sensitive to such movements have also been assessed in this report. A number of natural and built features have been identified within or in the vicinity of the Study Area including: Bora Creek, Goulburn River and ephemeral drainage lines; cliffs; the Goulburn River National Park; Sandy Hollow – Gulgong Railway Line; roads; unsealed tracks and trails; electrical and telecommunications infrastructure; dams; a quarry; bores; mine infrastructure; exploration drill holes; archaeological sites; and survey control marks.

[1] Longwalls 401-408 and the area of land within the furthest extent of the 26.5 degree (°) angle of draw and 20 millimetres (mm) predicted subsidence contour.

Figure 4: Natural Features within and in the vicinity of the Study Area

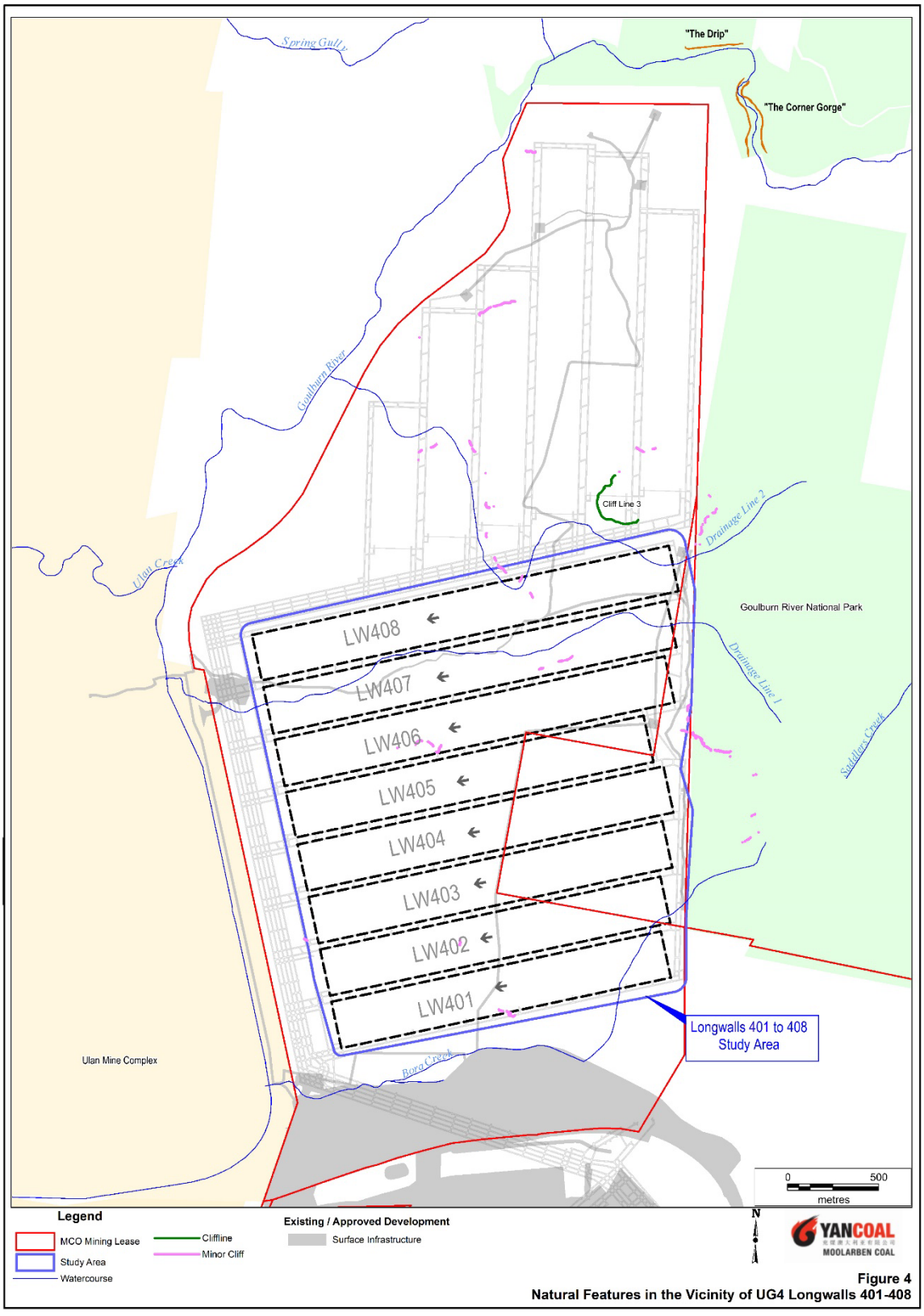
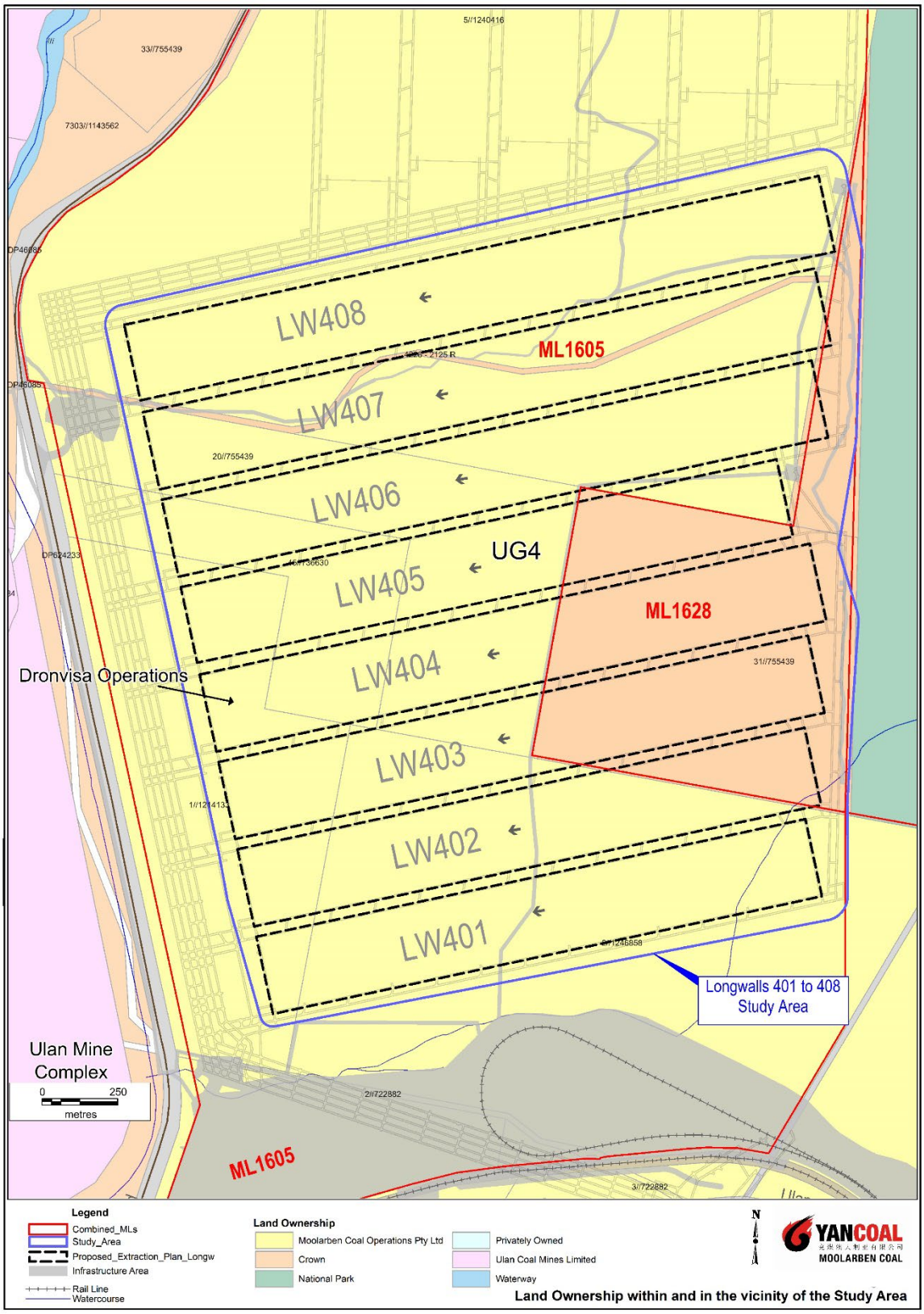


Figure 4
Natural Features in the Vicinity of UG4 Longwalls 401-408

Figure 5: Land Ownership within and in the vicinity of the Study Area



1.2 STRUCTURE OF THE LONGWALLS 401- 408 PSMP

The remainder of the LW401-408 PSMP is structured as follows:

Section 2 Describes the review and update of the LW401-408 PSMP.

Section 3 Outlines the statutory requirements applicable to the LW401-408 PSMP.

Section 4 Provides baseline data and the extraction schedule.

Section 5 Describes the process and outcomes of the risk assessment.

Section 6 Details the performance measures relevant to public safety.

Section 7 Describes the monitoring program.

Section 8 Describes the management measures that will be implemented.

Section 9 Details the performance indicators that will be used to assess the Project against the performance measures.

Section 10 Provides a contingency plan to manage any unpredicted impacts and their consequences.

Section 11 Describes the roles and responsibilities for MCO personnel and key contacts.

Section 12 Describes the program to collect sufficient baseline data for future Extraction Plans.

Section 13 Describes the annual review, audits, regular reporting and improvement of environmental performance.

Section 14 Outlines the management and reporting of incidents.

Section 15 Outlines the management and reporting of complaints.

Section 16 Outlines the management and reporting of non-compliances with statutory requirements.

Section 17 Lists the references cited in this LW401-408 PSMP.

2.0 PUBLIC SAFETY MANAGEMENT PLAN REVIEW AND UPDATE

In accordance with Condition 5, Schedule 5 of Project Approval (05_0117), this LW401-408 PSMP will be reviewed as followed:

> *5. Within 3 months of the submission of:*
>
> *(a) the submission of annual review under condition 4 above;*
>
> *(b) the submission of an incident report under condition 7 below;*
>
> *(c) the submission of an audit under condition 9 below; or*
>
> *(d) any modification to the conditions of this approval,*
>
> *the Proponent shall review and, if necessary, revise the strategies, plans, and programs required under this approval to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval.*

2.1 ACCESS TO INFORMATION

In accordance with Condition 11, Schedule 5 of Project Approval (05_0117), MCO will make the approved LW401-408 PSMP publicly available on the MCO website.

3.0 STATUTORY REQUIREMENTS

MCO's statutory obligations are contained in:

- the conditions of the NSW Project Approval (05_0117) (as modified) and NSW Project Approval (08_0135) (as modified);
- the conditions of Commonwealth Approvals (EPBC 2007/3297, EPBC 2013/6926, EPBC 2008/4444 and EPBC 2017/7974);
- relevant licences and permits, including conditions attached to the Environment Protection Licence (EPL No. 12932) and MLs (i.e. ML 1605, ML 1606, ML 1628, ML 1691 and ML 1715); and
- other relevant legislation.

Obligations relevant to this LW401-408 PSMP are described below.

3.1 EP&A ACT APPROVAL

Condition 77(g), Schedule 4 of Project Approval (05_0117), requires the preparation of a Built Features Management Plan as a component of the Extraction Plan. In addition, Conditions 75, 77(n), 77(p) and 79, Schedule 4 and Condition 3, Schedule 5 of Project Approval (05_0117) outline general management plan requirements that are applicable to the preparation of this LW401-408 PSMP.

Table 1 presents the relevant project approval requirements and indicates where they are addressed within this LW401- 408 PSMP.

Table 1 Management Plan Requirements

Project Approval (05_0117) Condition	LW401-408 PSMP Section
Condition 77, Schedule 3	
77. The Proponent shall prepare and implement an Extraction Plan for all second workings on site to the satisfaction of the Secretary. Each extraction plan must:	
...	
(l) include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety in the mining area;	**This document**
...	
(n) include a contingency plan that expressly provides for adaptive management where monitoring indicates that there has been an exceedance of any performance measure in Tables 18 and 19, or where any such exceedances seem likely;	**Section 10**
...	
(p) include a program to collect sufficient baseline data for future Extraction Plans.	**Section 12**
Condition 78, Schedule 3	
78. The Proponent shall ensure that the management plans required under conditions 77(g)-(l) above include:	
(a) an assessment of the potential environmental consequences of the Extraction Plan incorporating any relevant information that has been obtained since this approval; and	**Sections 7.5**
(b) a detailed description of the measures that would be implemented to remediate predicted impacts.	**Section 8**
Condition 3, Schedule 5	
3. 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 4.1**
(b) a description of:	
• *the relevant statutory requirements (including any relevant approval, licence or lease conditions);*	**Section 3**
• *any relevant limits or performance measures/criteria;*	**Section 6**
• *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 9**
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	**Sections 8 and 10**
(d) a program to monitor and report on the:	**Sections 7 and 13**
• *impacts and environmental performance of the project;*	
• *effectiveness of any management measures (see c above)*	
(e) a contingency plan to manage any unpredicted impacts and their consequences;	**Section 10**
(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	**Section 7 and 13**
(g) a protocol for managing and reporting any:	
• *incidents;*	**Section 14**
• *complaints;*	**Section 15**
• *non-compliances with statutory requirements; and*	**Section 16**
• *exceedances of the impact assessment criteria and/or performance criteria; and*	**Sections 9 and 10**
(h) a protocol for periodic review of the plan.	**Section 2**

3.2 OTHER LEGISLATION

MCO will operate the Moolarben Coal Complex consistent with with Project Approval (05_0117) (as modified) and Project Approval (08_0135) (as modified) and any other legislation that is applicable to an approved Part 3A Project under the EP&A Act.

The following Acts may be applicable to, but are not limited to, the conduct of the Moolarben Coal Complex:

- *Crown Lands Act, 1989;*
- *Fisheries Management Act, 1994;*
- *Heritage Act, 1977;*
- *Coal Mine Subsidence Compensation Act, 2017;*
- *Mining Act, 1992;*
- *National Parks and Wildlife Act, 1974;*
- *Biodiversity Conservation Act, 2016;*
- *Protection of the Environment Operations Act, 1997;*
- *Roads Act, 1993;*
- *Water Act, 1912;*
- *Water Management Act, 2000;*
- *Work Health and Safety Act, 2011*; and
- *Work Health and Safety (Mines and Petroleum Sites) Act, 2013.*

Relevant licences or approvals required under these Acts will be obtained as required.

4.0 BASELINE DATA AND EXTRACTION SCHEDULE

4.1 BASELINE DATA

Baseline data in relation to the potential consequences of mining is provided in the various management plans prepared under the Extraction Plan. The plans of relevance to public safety include:

- UG4 Longwalls 401-408 Land Management Plan (LW401-408 LMP) (**Appendix B**) which outlines the management of potential environmental consequences on cliffs and land in general; and
- UG4 Longwalls 401-408 Built Features Management Plans (LW401-408 BFMPs) (**Appendix E**) which describe potential consequences on surface infrastructure. LW401-408 BFMPs have been prepared for the following infrastructure owners and assets:
  - Essential Energy assets (e.g. 22 kV circuit powerline supported on timber poles);
  - MWRC assets (e.g. Ulan Road including road pavement, embankments, tunnels and culverts, Ulan Road bridge over the Goulburn River, Ulan Road and bridge over Sandy Hollow Gulgong Railway);
  - Telstra assets (e.g. optical fibre, copper cables and telecommunications tower);
  - ARTC assets (e.g. Sandy Hollow Gulgong Railway and associated culverts);
  - UCMPL assets (e.g. Millers Dam compound, powerline, pipelines and bridge over the Goulburn River); and
  - Dronvisa Quarry assets (e.g. Quarry pits, access tracks, water management structures, rehabilitation areas, site infrastructure; and drainage lines).

The nearest TransGrid asset is a 330 kV electricity transmission line (ETL) and tower structures, are 725m from Longwall 401. At over 7 times the depth of cover the towers will not be subject to measurable mine subsidence ground movements and therefore no specific BFMP for these assets are necessary (MSEC, 2021).

MCO have included the predictions of the 330 kV ETL in the *Subsidence Predictions and Impact Assessment for Longwalls 401 to 408* (MSEC, 2021) and provided this information to TransGrid in July 2021 for their records.

MCO assets and mine infrastructure will be considered in the Subsidence Principal Hazard Management Plan that addresses safety of mine workers under the Work Health and Safety (Mines and Petroleum) legislation.

4.2 LONGWALLS 401- 408 EXTRACTION SCHEDULE

Longwalls 401-408 and the area of land within the furthest extent of the 26.5° angle of draw and 20 mm predicted subsidence contour (i.e. the Longwalls 401-408 Study Area) are shown on Figure 3. Longwall extraction will occur from the east to the west. The longwall layout includes approximately 260 m panel widths (void) with 35 m width pillars (solid). The provisional extraction schedule for Longwalls 401-408 is provided in **Table 2**.

Table 2 Provisional Extraction Schedule

Longwall	Estimated Start Date	Estimated Duration (months)	Estimated Completion Date
LW401	June 2022	4	October 2022
LW402	November 2022	4	March 2023
LW403	April 2023	4	August 2023
LW404	August 2023	5	January 2024
LW405	February 2024	4	June 2024
LW406	July 2024	5	December 2024
LW407	January 2025	4	May 2025
LW408	June 2025	4	November 2025

4.3 REVISED SUBSIDENCE AND IMPACT PREDICTIONS

Revised predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, have been prepared by MSEC incorporating any relevant information obtained since approval.

The LW401-408 PSMP for UG4 has incorporated the revised subsidence predictions and impacts from the *Subsidence Predictions and Impact Assessment for Longwalls 401 to 408* (MSEC, 2021) and described in **Section 4.3.1**

4.3.1 UG4 Subsidence Predictions and Impacts on Cliffs

MCO are required to minimise subsidence damage to cliff line 3 (CL3) and nil impact or environmental consequence at cliff line 5 (CL5). A detailed assessment to identify all possible cliffs[2] within and in the vicinity of the Study Area was completed by MSEC (2021) using 1 m surface level contours generated from a Light Detection and Ranging (LiDAR) survey and from site investigations. A summary of cliffs confirmed within the Study Area and outside of the Study Area is provided in **Table 3**. The locations of the cliffs are shown in **Figure 4**.

Table 3 Classification of Cliffs Within and in the Vicinity of the Study Area

Cliff Line Area ID	Maximum Height (m)	Maximum Length (m)	Classification	Location
CL3	15	500	Cliff	Outside of Study Area
CL5*	30	330	Cliff	Outside of Study Area
CL6	10	30	Minor Cliff	Above LW406
CL7	6	40	Minor Cliff	75m from LW406

Notes: * (The Drip & Corner Gorge)

Only CL3 and CL5 are classified as cliffs. Cliff CL5 is located over 2.7 km from Longwall 408 and is unlikely to experience subsidence related movements due to the extraction of Longwalls 401 to 408 (**Figure 4**). Cliff CL3 is located over 165 m to the north of Longwall 408. Cliff Line CL3 is located over 1 depth of

[2] The definitions of cliffs provided in the NSW DP&E *Standard and Model Conditions for Underground Mining* (DP&E, 2012) are: *Continuous rock face, including overhangs, having a minimum length of 20 metres, a minimum height of 10 metres and a minimum slope of 2 to 1 (>63.4º)*

cover from the longwalls (**Figure 4**). At this distance conventional mine subsidence ground movements and valley related movements are expected to be less than limits of survey accuracy. However, the cliff may experience far-field horizontal movements (MSEC, 2021).

Although there are no cliffs within the Study Area, MCO have developed monitoring and management strategies in this LW401-408 PSMP (**Section 7** and **Section 8**) for UG4 to manage the potential hazards associated with potential impacts to minor cliffs.

Baseline monitoring of the cliff CL3 will be established prior to longwall extraction LW401 for comparative assessments in the unlikely event CL3 experiences subsidence related impacts from far field horizontal movements (LW401-408 LMP).

4.3.2 UG4 Subsidence Predictions and Impacts on Land

Longwall mining can result in surface cracking, heaving, buckling, humping and stepping at the surface. The extent and severity of these mining induced ground deformations are dependent on a number of factors, including the mine geometry, depth of cover, overburden geology, locations of natural joints in the bedrock, the presence of near surface geological structures and mining conditions (MSEC, 2021).

The depths of cover over the underground mining areas vary from 83 m to 205 m. Where the depths of cover above Longwalls 401 to 408 are less than 100 m, surface cracking is expected to be typically in the order of 150 to 200 mm wide, but could be as large as 500 mm wide where the depths of cover are the shallowest. The surface crack widths are likely to be smaller where the depths of cover are greater, or where the surface cracks result from the travelling wave. Where the depths of cover above Longwalls 401 to 408 are 100 to 150 m, the surface crack widths are expected to be typically in the order of 100 to 150 mm wide (MSEC, 2021).

The surface cracking and deformation could result in safety issues (i.e. trip hazards), affect vehicle access (i.e. large deformations in access tracks), or result in increased erosion (especially along the drainage lines and the steeper slopes) (MSEC, 2021).

MCO have developed monitoring and management strategies in this LW401-408 PSMP (**Section 7** and **Section 8**) for UG4 to manage the potential hazards associated with potential impacts to land in general.

4.3.3 PUBLIC UTILITIES & PRIVATELY-OWNED BUILT FEATURES

Each of the LW401-408 BFMPs (**Section 4.1**) includes the collection of baseline data (e.g. by visual audit/inspection/survey) in relation to the integrity of the built features, revised subsidence predictions, considering safety, serviceability and the ability to repair. Baseline subsidence survey and monitoring for each infrastructure asset is described in each of the LW401-408 BFMPs (**Appendix E**) and outlined in the UG4 Longwalls 401 to 408 Subsidence Monitoring Program (LW401-408 SMP) (**Appendix G**).

Dronvisa Quarry is the only privately-owned built feature within the Study Area. All public utilities and other privately-owned built features are located outside of the Study Area. With exception to the Dronvisa Quarry, adverse subsidence impacts on public utilities and privately-owned built features are not expected to occur. However as described by MSEC (2021), there is the potential for far field horizontal movements of a minor nature to occur, these far field movements are unlikely to cause adverse impacts.

A summary of consultation undertaken with relevant built feature owners is provided in Attachment 2 (Table A2-2) of the Extraction Plan. Consultation with each built feature owner/manager was generally conducted in accordance with the protocol in Section 2.3.2 of the Extraction Plan.

4.3.4 MCO ASSETS

MCO's Coal Handling and Preparation Plant (CHPP) is located 230 m to 650 m to the south of Longwall 401. The CHPP will not be subjected to measurable conventional mine subsidence ground movements (i.e. less than limits of survey accuracy); however, the site features may experience far-field horizontal movements (MSEC, 2021)

Dewatering infrastructure is located above the Extraction Plan Layout. The dewatering infrastructure includes dewatering bores, water pipelines and electrical cables. The polyethylene pipelines and cables are flexible and laid on the ground surface. Potential impacts could occur as a result of irregular movements such as ground heave, stepping, large cracks, rock falls or tree falls (MSEC,2021).

Exploration drill sites are located directly above and adjacent to the proposed longwalls and, therefore, could experience the full range of predicted subsidence movements. It is likely, therefore, that fracturing and shearing would occur in the drill holes as the result of mining (MSEC, 2021).

Fences are located within the Study Area and are constructed in a variety of ways, generally using either timber or metal materials. All fences are on MCO owned lands. The fences could experience the full range of predicted subsidence movements. There are five farm dams owned by MCO that have been identified within the Study Area (D6, D7, D11, D12 and D13). The dams are shallow but are no longer in use (MSEC, 2021).

There are a number of MCO owned four wheel drive tracks through the Study Area, these tracks are not publicly accessible. The tracks could experience the full range of predicted subsidence movements. Impacts are expected to include cracking, stepping and rippling of the track surfaces (MSEC, 2021).

The control of MCO assets, infrastructure and personnel will be undertaken in accordance with the Subsidence Principal Hazard Management Plan. The MCO assets and mine infrastructure relevant to Longwalls 401 to 408 are shown on Plan 7 in the LW401-408 SMP.

4.4 LAND OWNERSHIP

A land ownership plan is provided on **Figure 5**. In summary, all land within the furthest extent of the 26.5° angle of draw and 20 mm predicted subsidence contour (i.e. the Longwalls 401- 408 Study Area) is mine-owned, with the exception of a parcel of land owned by The State of New South Wales (Crown Land).

MCO has consulted with NSW Department of Industry – Lands (Crown Lands) in relation to the LW401-408 LMP. A summary of the consultation with Crown Lands and other government agencies regarding the key issues raised is provided in Attachment 2 (Table A2-1) of the Extraction Plan.

5.0 RISK ASSESSMENT

In accordance with the draft Guidelines for the Preparation of Extraction Plans (DP&E and DRE, 2015), potential risks and potential risk control measures and procedures have been considered at a risk assessment for public safety for UG4 Longwalls 401-408. The public safety risk assessment was completed on 07 September 2021.

Attendees at the risk assessment meeting included representatives from MCO (including the Underground Technical Services Manager and Environment and Community Manager), MSEC and a risk assessment facilitator (AXYS Consulting Pty Ltd [AXYS]). The investigation and analysis methods used during the risk assessment reviewed potential safety hazards to the public for LW401 to 408 including:

- potential subsidence impacts on public utilities, privately owned and MCO owned built features;
- potential instability of cliffs and minor cliffs caused by subsidence;
- deformations or fracturing of any land caused by subsidence; and
- any other impacts of subsidence.

The risk assessment included consideration of the environmental risk assessment relevant to the LW401-408 LMP and the risk assessments conducted for the LW401-408 BFMPs with each relevant infrastructure owners (**Section 4.1**).

A number of risk control and management measures were identified during the risk assessment which considered in the management measures in **Section 8**. Monitoring of potential risks to public safety is described in **Section 7**.

MCO considers all risk control measures and procedures to be feasible to manage all identified risks.

6.0 PERFORMANCE MEASURES

The performance measure specified in Table 15, Schedule 3 of Project Approval (05_0117) relevant to the public safety, is listed in **Table 4.**

Table 4 Public Safety Subsidence Impact Performance Measure

Feature	Subsidence Impact Performance Measure
Public Safety:	
Public safety	Negligible additional risk

Source: Table 15 in Schedule 3 of Project Approval (05_0117).

In accordance with Condition 75, Schedule 4 of Project Approval (05_0117), MCO must ensure that there is no exceedance of the performance measures listed in Table 15, Schedule 3 of Project Approval (05_0117), to the satisfaction of the Secretary of the DPIE.

Section 7 outlines the monitoring that will be undertaken to assess the impact of Longwalls 401- 408 against the performance measures in relation to the public safety. Management measures are outlined in **Section 8** and performance indicators for the performance measures are summarised in **Section 9**.

7.0 MONITORING

As described in **Section 5.0**, the investigation and analysis methods used during the risk assessment reviewed potential safety hazards to the public and built feature owners for Longwalls 401 to 408. MCO have developed the following monitoring program to address the key risks identified from the public safety risk assessment, including impacts to cliffs and land in general.

The components of the program to monitor subsidence parameters are illustrated in Plan 7 (LW401-408 SMP) (**Appendix G**) prepared in accordance with the draft DP&E and DRE (2015) *Guidelines for the Preparation of Extraction Plans*.

Elements of the subsidence monitoring program, including the monitoring layout for assessment of impacts on built and natural features are summarised below and in the LW401-408 SMP.

7.1 CLIFFS

A monitoring program will be implemented to monitor subsidence and the impacts and environmental performance on cliff line CL3 during extraction of Longwalls 401-408, as outlined in the LW401-408 LMP.

The monitoring program includes:

- measurement of subsidence parameters as outlined in the LW401-408 SMP; and
- monitoring of subsidence impacts on specific cliffs (i.e. CL3) as discussed below.

Visual inspections of cliff line CL3 will be conducted prior to commencement of secondary extraction of Longwall 401 to photographically record the baseline condition of these cliff lines.

Visual inspections at the completion of Longwall LW408. The post mining inspections at the completion of Longwall 408 will be carried out with comparisons made against the pre-mining condition for CL3.

If subsidence impact(s) are observed during an inspection, the following details will be noted and/or photographed:

- the date of the inspection;
- the location of longwall extraction (i.e. the longwall chainage);
- the location of the impact;
- the nature and extent of the impact;
- other relevant aspects such as water seepage (which can indicate weaknesses in the rock);
- whether any actions are required (e.g. implementation of management measures, initiation of the Contingency Plan, incident notification, implementation of appropriate safety controls, review of public safety etc); and
- any other relevant information.

7.2 LAND IN GENERAL

A monitoring program will be implemented to monitor subsidence and the impacts on the land in general, and environmental performance during extraction of Longwalls 401-408, as outlined in the LW401-408 LMP.

The monitoring program includes:

- measurement of subsidence parameters as outlined in the LW401-408 SMP; and
- monitoring of subsidence impacts on surface features as discussed below.

Land in general includes other land features such as fire trails and vehicular tracks. Unsealed vehicular tracks and fire trails are located throughout the UG4 Study Area and above Longwalls 401- 408. Visual inspections of land in general including MCO's vehicular tracks and surrounds will be conducted opportunistically during mining.

Where relevant, inspections of subsidence impacts on other surface features will include detailed measurement and photographic record of the impact.

The monitoring results will be used to assess and inform regarding the potential environmental consequences of the subsidence impacts and identify management measures, where appropriate.

7.3 PUBLIC UTILITIES & PRIVATELY OWEND BUILT FEATURES

Each of the LW401-408 BFMPs details the relevant monitoring program to be implemented to ensure that the performance measure of '*safe*' in relation to the infrastructure asset is achieved. These include monitoring impacts to:

- Essential Energy assets (e.g. 22 kV circuit powerline supported on timber poles) - (LW401-408 BFMP-EE);
- MWRC assets (e.g. Ulan Road including road pavement, embankments, tunnels and culverts, Ulan Road bridge over the Goulburn River, Ulan Road and bridge over Sandy Hollow Gulgong Railway) - (LW401-408 BFMP-MWRC);
- Telstra assets (e.g. optical fibre, copper cables and telecommunications tower) - (LW401-408 BFMP-TELSTRA);
- ARTC assets (e.g. Sandy Hollow Gulgong Railway) - (LW401-408 BFMP-ARTC).
- UCMPL assets (e.g. Millers Dam compound, powerline, pipelines and bridge over the Goulburn River) - (LW401-408 BFMP-UCMPL); and
- Dronvisa Quarry assets (e.g. Quarry pits, access tracks, water management structures, rehabilitation areas, site infrastructure and drainage lines) - (LW401-408 BFMP-DRONVISA).

7.4 MCO OWNED BUILT FEATURES

Inspections of mine infrastructure and assets (**Section 4.4**) within the Study Area will be conducted by MCO as described in the LW401-408 SMP, and include:

- Routine and opportunistic visual inspections of security measures including gates and fences, dewatering infrastructure, pipelines, electrical cables, roads, tracks, fences and farm dams during active mining to identify subsidence predicted impacts, partially for those assets that are expected to experience the full range of subsidence movements within the Study Area; and
- Pre mining and during mining visual inspections and far field horizontal monitoring to manage potential impacts to the CHPP for the duration of Longwall 401.

MCO will compare the results of the subsidence impact monitoring against the performance measure and indicators (**Sections 6** and **9**). In the event the observed subsidence impacts exceed the performance measure or indicators, MCO will assess the consequences of the exceedance in accordance with the Contingency Plan described in **Section 10**.

8.0 MANAGEMENT MEASURES

Risk controls and management measures applicable to public safety are described in **Sections 8.1** to **8.4** below. Follow-up inspections will be conducted to assess the effectiveness of the management measures implemented and the requirement for any additional management measures. Management measures for public safety will be reported in the Annual Review.

8.1 RESTRICTED PUBLIC ACCESS

With the exception of a portion of land (Lot 31, DP755439) owned by The State of NSW (Crown Land), all other land within the Longwalls 401-408 Study Area is owned or controlled by MCO (**Figure 5**).

The majority of the Study Area is considered remote undeveloped bushland with only several vehicular access points providing entry to Longwalls 401 - 408 (**Figure 2**). All vehicular entry points into the Study Area are secured by MCO with a locked gate and accompanied by appropriate signage. Accessibility to the general public is further restricted to the Longwalls 401- 408 Study Area by boundary fencing and signage. MCO regularly inspect and maintain gates and boundary fencing to ensure access from the public into MCO mining areas are restricted.

Access to surface areas subject to subsidence impacts will be controlled by Underground (surface) works personnel who will undertake inspections before providing access to personnel.

8.2 LAND MANAGEMENT PLAN

A number of potential management measures are available to mitigate/remediate subsidence impacts to land features (i.e. cliffs and land in general) resulting from the extraction of Longwalls 401- 408. Potential management measures that will be considered to mitigate/remediate environmental consequences are detailed in the LW401-408 LMP, and include:

- stabilisation techniques;
- erosion and sediment control techniques;
- remediation of surface tension cracks; and
- site access control and signage.

The requirement and methodology for any subsidence remediation techniques will be determined in consideration of:

- potential impacts of the unmitigated impact, including potential risks to public safety and the potential for self-healing or long-term degradation; and
- potential impacts of the remediation technique, including site accessibility.

Potential management measures in relation to subsidence impacts on land include additional signage to warn persons accessing the area of safety hazard, and construction of barriers to restrict access to unsafe areas.

Follow-up inspections will be conducted to assess the effectiveness of implemented management measures and the requirement for any additional management measures.

8.3 PUBLIC UTILITIES & PRIVATELY OWEND BUILT FEATURES

Where subsidence impacts on infrastructure items that may impact on public safety are detected or at any time MCO or the asset owner considers that the integrity of the asset and/or public safety may be compromised, repair works and/or contingency measures will be implemented in accordance with the relevant LW401-408 BFMP.

Each LW401-408 BFMP describes the potential repair works and/or contingency measures to ensure the relevant performance measure of '*safe*' in relation to the infrastructure asset is achieved in relation to subsidence impacts to:

- Essential Energy assets (e.g. 22 kV circuit powerline supported on timber poles) - (LW401-408 BFMP-EE);
- MWRC assets (e.g. Ulan Road including road pavement, embankments, tunnels and culverts, Ulan Road bridge over the Goulburn River, Ulan Road and bridge over Sandy Hollow Gulgong Railway) - (LW401-408 BFMP-MWRC);
- Telstra assets (e.g. optical fibre, copper cables and telecommunications tower) - (LW401-408 BFMP-TELSTRA);
- ARTC assets (e.g. Sandy Hollow Gulgong Railway) - (LW401-408 BFMP-ARTC).
- UCMPL assets (e.g. Millers Dam compound, powerline, pipelines and bridge over the Goulburn River) - (LW401-408 BFMP-UCMPL); and
- Dronvisa Quarry assets (e.g. Quarry pits, access tracks, water management structures, rehabilitation areas, site infrastructure and drainage lines) - (LW401-408 BFMP-DRONVISA).

Other general potential management measures in relation to public safety include:

- erection additional signage at access points to the Study Area;

8.4 OTHER LANDOWNERS

With the exception of a portion of land (Lot 31, DP755439) owned by Crown Land all other within the Longwalls 401- 408 Study Area is owned by MCO. Should any subsidence impacts be identified that pose a risk to public safety, MCO will implement management measures in consultation with Crown Land.

9.0 ASSESSMENT OF PERFORMANCE INDICATORS AND MEASURES

In accordance with Condition 77(d), Schedule 4 of Project Approval (05_0117), performance indicators have been developed for the performance measures listed in (**Section 6**).

MCO will assess Longwalls 401- 408 against the following public safety performance indicator in the event that any hazard to the general public arising from subsidence impacts becomes evident:

- No more than *negligible additional risk* to public safety.

Specific performance indicators have also been developed with each asset owner and are described in the individual LW401-408 BFMPs.

Monitoring conducted to inform the assessment of secondary extraction of Longwalls 401- 408 against the performance indicator for the performance measure is outlined in **Section 7**.

If the performance measure is considered to have been exceeded, the Contingency Plan outlined in **Section 10** of this LW401-408 PSMP will be implemented.

10.0 CONTINGENCY PLAN

In the event the relevant performance measure of "negligible additional risk to public safety" is considered to have been exceeded or is likely to be exceeded, MCO will implement the following Contingency Plan:

- The observation will be reported to the Underground Technical Manager or the Environment and Community Manager within 24 hours.
- The observation will be recorded in the Subsidence Impact Register Template (LW401-408 SMP).
- The likely exceedance will be reported in an Incident Report (refer to the Extraction Plan).
- MCO will provide the Incident Report to relevant stakeholders.
- MCO will conduct an investigation to identify and evaluate contributing factors to the exceedance, including re-survey of the relevant subsidence monitoring lines, analysis of predicted versus observed subsidence parameters and a review of the subsidence monitoring program with updates to the program where appropriate.
- An appropriate course of action will be developed in consultation with relevant stakeholders and government agencies including proposed contingency measures (**Section 10.1**), and a program to review the effectiveness of the contingency measures.
- The course of action will be approved by, and implemented to the satisfaction of the DPIE and the DPIE-RR.
- This LW401-408 PSMP and the performance indicators will be reviewed to adequately manage future potential impacts within the limits of Project Approval (05_0117).

10.1 CONTINGENCY MEASURES

Potential contingency measures for an exceedance of the performance measure for public safety include:

- The conduct of additional monitoring (e.g. increase in monitoring frequency or additional sampling) to inform the proposed contingency measures.
- The repair or replacement of the damaged asset.
- The implementation of adaptive management measures. Examples of adaptive management measures include reducing the thickness of the coal seam extracted, narrowing of the longwall panels and/or increasing the setback of the longwalls from the affected area.

Contingency measures will be developed in consideration of the specific circumstances of the feature (e.g. the location, nature and extent of the impact and the assessment of environmental consequences).

11.0 ROLES AND RESPONSIBILITIES

Key responsibilities of MCO personnel in relation to this LW401-408 PSMP are summarised in **Table 5**. Responsibilities may be delegated as required.

Table 5 Longwalls 401 to 408 PSMP Responsibility Summary

Responsibility	Task
General Manager	• Ensure resources are available to MCO personnel to facilitate the completion of responsibilities under this LW401-408 PSMP.
Underground Technical Manager	• Ensure the LW401-408 SMP is implemented. • Ensure monitoring required under this LW401-408 PSMP is carried out within specified timeframes, adequately checked and processed and prepared to the required standard. • Undertake relevant monitoring and implementation of management measures summarised in **Sections 7** and **8** respectively.
Environment and Community Manager	• Ensure the LW401-408 PSMP is implemented. • Liaise with relevant stakeholders regarding subsidence impact management and related environmental consequences.
Registered Mine Surveyor	• Undertake all subsidence monitoring to the required standard within the specified timeframes and ensure data are adequately checked, processed and recorded.

11.1 KEY CONTACTS

The details of key contacts and phone numbers in relation to this LW401-408 PSMP are summarised in **Table 6**.

Table 6 Longwalls 401 to 408 PSMP Key Personnel Contact Details

Organisation	Position	Contact Name	Phone Number
MCO	**Underground Technical Manager**	Mr Liam Mildon	02 6376 1614
	Environment and Community Manager	Mr Trent Cini	02 6376 1407
	Safety Manager	Mr Stephen Robertson	02 6376 1624
	Moolarben Coal Hotline		1800 556 484
Resources Regulator	**Principal Subsidence Engineer**	Dr Gang Li	02 4931 6644

12.0 FUTURE EXTRACTION PLANS

In accordance with Condition 77(p), Schedule 4 of Project Approval (08_0117), MCO will collect baseline data for future Extraction Plans. In addition to the baseline data collection, consideration of the environmental performance and management measures, in accordance with the review(s) conducted as part of this LW401-408 PSMP, will inform the appropriate type and frequency of monitoring of the assets relevant to the next Extraction Plan.

13.0 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

13.1 ANNUAL REVIEW

In accordance with Condition 4, Schedule 5 of Project Approval (05_0117), (as modified), MCO will conduct an annual review of operations conducted at the Moolarben Coal Complex (including the performance of the LW401-LW408 PSMP) prior to 31 March for the preceding calendar year, or as otherwise agreed by the Secretary of the DPIE.

The Annual Review will:

- describe the works carried out in the previous calendar year, and the development proposed to be carried out over the current calendar year;
- include a comprehensive review of the monitoring results and complaints records of the Project over the previous calendar year, including a comparison of these results against the:
  - relevant statutory requirements, limits or performance measures/criteria;
  - monitoring results of previous years; and
  - relevant predictions in the EA;
- identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;
- identify any trends in the monitoring data over the life of the Project;
- identify any discrepancies between the predicted and actual impacts of the Project, and analyse the potential cause of any significant discrepancies; and
- describe what measures will be implemented over the next year to improve the environmental performance of the Project.

In accordance with Condition 11, Schedule 5 of Project Approval (05_0117), the Annual Review will be made available on the MCO website. As described in **Section 2**, this LW401-408 PSMP will be reviewed within three months of the submission of an Annual Review, and, if necessary, revised to ensure the plan is updated on a regular basis and to incorporate any recommended measures to improve environmental performance.

13.2 AUDITS

In accordance with Condition 9, Schedule 5 of Project Approval (05_0117), an independent environmental audit was conducted by the end of December 2015 and every three years thereafter. Notwithstanding the three-yearly timing, an audit must also be carried out prior to the completion of longwall panels 404 and 408, the precise timing of these audits will be determined in consultation with the DPIE. A copy of the independent environmental audit will be provided to the Secretary of the DPIE and made available on the MCO website.

The independent environmental audit will be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary of the DPIE. The independent environmental audit will assess the environmental performance of the Project and assess whether it is complying with the requirements of Project Approval (05_0117), and any other relevant approvals, and recommend measures or actions to improve the environmental performance of the Project.

14.0 INCIDENTS

An incident is defined in Project Approval (05_0117) as a set of circumstances that:

- causes or threatens to cause material harm to the environment; and/or
- breaches or exceeds the limits or performance measures/criteria in Project Approval (05_0117) (as modified).

In the event that an incident which causes, or threatens to cause, material harm to the environment occurs, the incident will be managed in accordance with the Pollution Incident Response Management Plan.

The reporting of incidents will be conducted in accordance with Condition 7, Schedule 5 of Project Approval (05_0117).

MCO will notify the Secretary of DPIE and any other relevant agencies of any incident associated with the UG4 Underground Mine which causes or threatens to cause material harm to the environment immediately after MCO confirms that an incident has occurred. For any other incident associated with the UG4, MCO will notify the Secretary and any other relevant agencies as soon as practicable after becoming aware of the incident. Within seven days of the date of the incident, MCO will provide the Secretary of DPIE and any relevant agencies with a detailed report on the incident. The report 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.

15.0 COMPLAINTS

MCO maintains a Community Complaints Line (Phone Number: 1800 556 484) that is dedicated to the receipt of community complaints. The Community Complaints Line is publicly advertised and operates 24 hours per day, seven days a week, to receive any complaints from neighbouring residents or other stakeholders.

MCO has developed a Community Complaints Procedure which details the process to be followed when receiving, responding to and recording community complaints. The Community Complaints Procedure is supported by a Complaints Database.

The Community Complaints Procedure is a component of the MCO Environmental Management Strategy which requires the recording of relevant information including:

- the nature of complaint;
- method of the complaint;
- relevant monitoring results and meteorological data at the time of the complaint;
- site investigation outcomes;
- any necessary site activity and activity changes;
- any necessary actions assigned; and
- communication of the investigation outcome(s) to the complainant.

In accordance with Condition 11, Schedule 5 of Project Approval (05_0117), the complaints register will be updated monthly and made available on the MCO website.

16.0 NON-COMPLIANCES WITH STATUTORY REQUIREMENTS

A protocol for the managing and reporting of non-compliances with statutory requirements has been developed as a component of MCO's Environmental Management Strategy and is described below.

Compliance with all approvals, plans and procedures will be the responsibility of all personnel (staff and contractors) employed on or in association with the Moolarben Coal Complex.

The Environmental and Community Manager (or delegate) will undertake regular inspections, internal audits and initiate directions identifying any remediation/rectification work required, and areas of actual or potential non-compliance.

As described in Section 14, MCO will notify the Secretary of the DPIE, and any other relevant agencies, of any incident associated with MCO immediately after MCO becomes aware of the incident. Within seven days of the date of the incident, MCO will provide the Secretary of the DPIE, and any relevant agencies, with a detailed report on the incident.

A review of MCO's compliance with all conditions of Project Approval (05_0117), mining leases and all other approvals and licenses will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the MCO website.

As described in **Section 13.1**, an independent environmental audit was conducted by the end of December 2015 and undertaken every three years thereafter. A copy of the audit report will be submitted to the Secretary of the DPIE and made publicly available on the MCO website.

17.0 REFERENCES

AXYS Consulting (2021) *Moolarben Mine Potential Impact of Longwall 401 to 408 on Public Safety.* Report Number AR3211.

Department of Planning and Environment and NSW Trade & Investment – Division of Resources and Energy (2015) *Guidelines for the Preparation of Extraction Plans Required under Conditions of Development Consents, Project Approvals and Mining Lease Conditions for Underground Coal Mining*. Version 5. Draft.

Mine Subsidence Engineering Consultants (2021) *Subsidence Predictions and Impact Assessment for Longwalls 401 to 408* (MSEC, 2021)