



# UG1 LONGWALLS 101 TO 105 PUBLIC SAFETY MANAGEMENT PLAN

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## 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], Sojitz Moolarben Resources Pty Ltd and a consortium of Korean power companies). MCO and MCM are wholly owned subsidiaries of Yancoal Australia Limited.

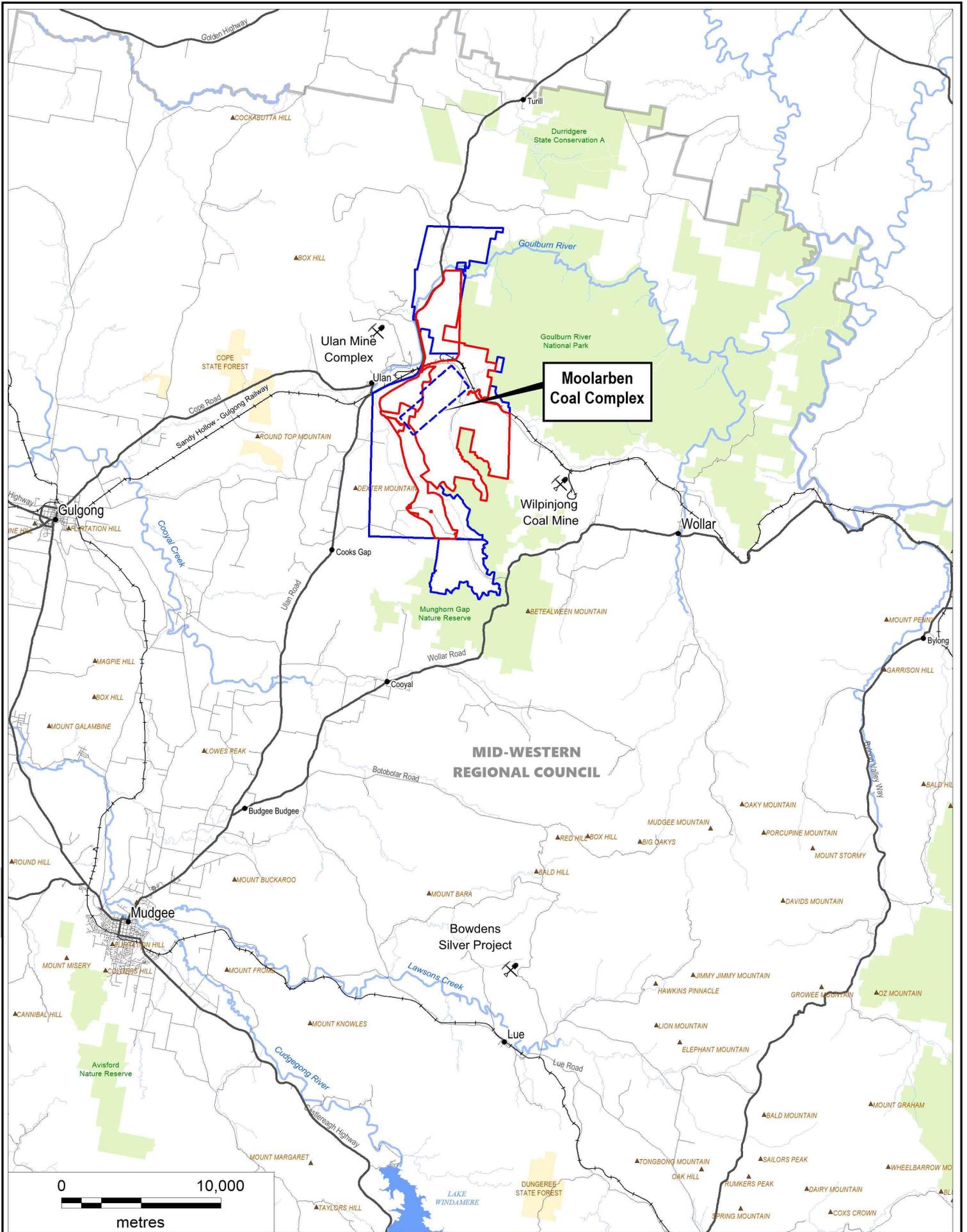
The Moolarben Coal Complex comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities) (Figure 2).

Since the commencement of coal mining operations in 2010, mining activities have occurred within OC1, OC2, OC4 and UG1 (Figure 2).

The UG1 Underground Mine is a component of the approved Moolarben Coal Complex (Figure 2). The UG1 Underground Mine commenced first workings in April 2016 and commenced secondary workings (longwall extraction) in October 2017 by longwall mining methods from the Ulan Seam within Mining Lease (ML) 1605, ML 1606, ML 1628, ML 1691 and ML 1715 (Figure 3).

Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038 in accordance with Project Approval (05\_0117) (Moolarben Coal Project Stage) (as modified) and Project Approval (08\_0135) (Moolarben Coal Project Stage 2) (as modified).

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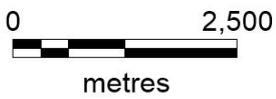
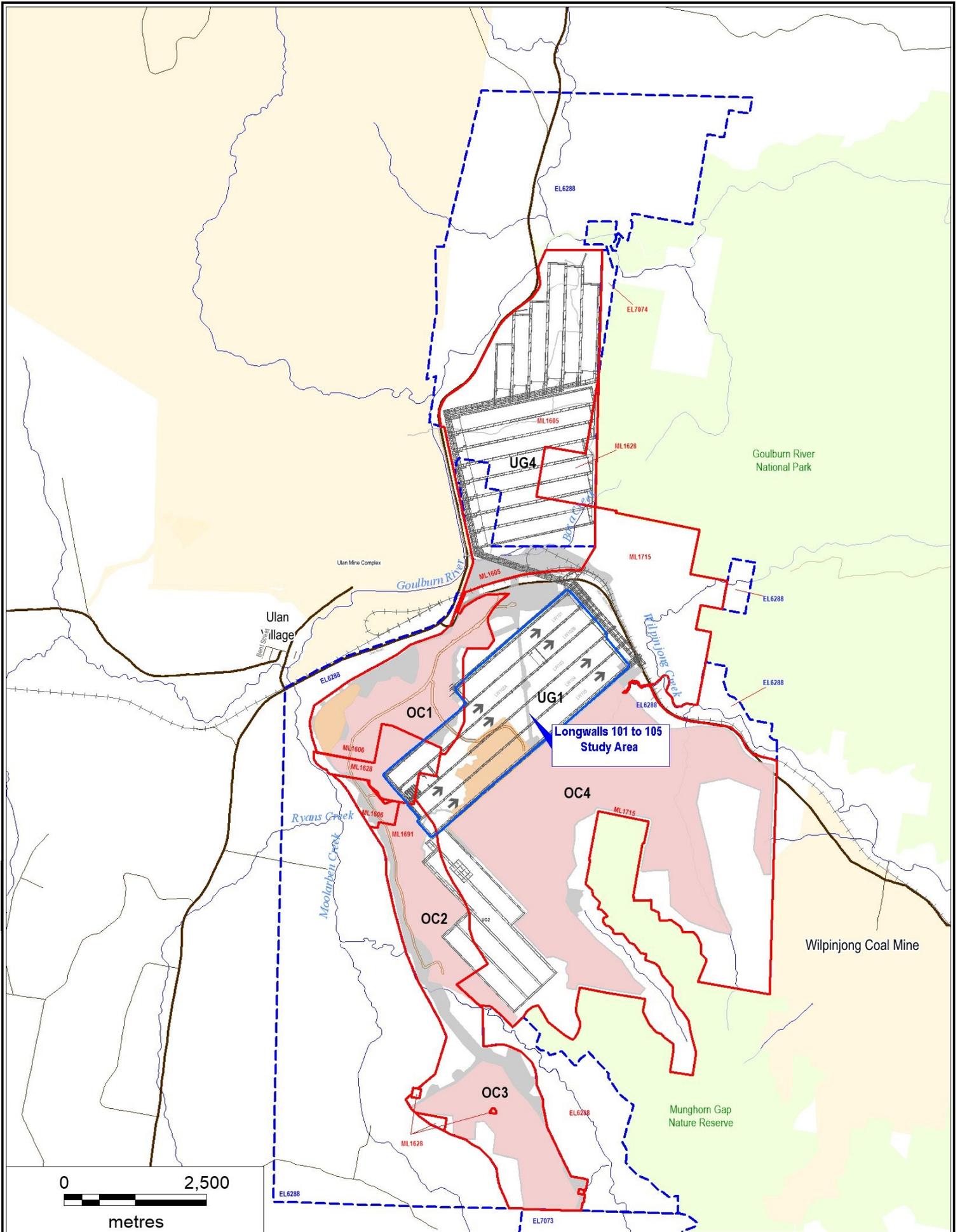


**Legend**

- Exploration Licence Boundary
- Mining Lease Boundary
- Local Government Area
- National Park / Nature Reserve
- State Forest
- Mining Project



**Figure 1**  
**Regional Location**



**Legend**

-  Exploration Licence Boundary
-  Mining Lease Boundary
-  Haul Road
-  Rail Line
-  Watercourse

**Existing / Approved Development**

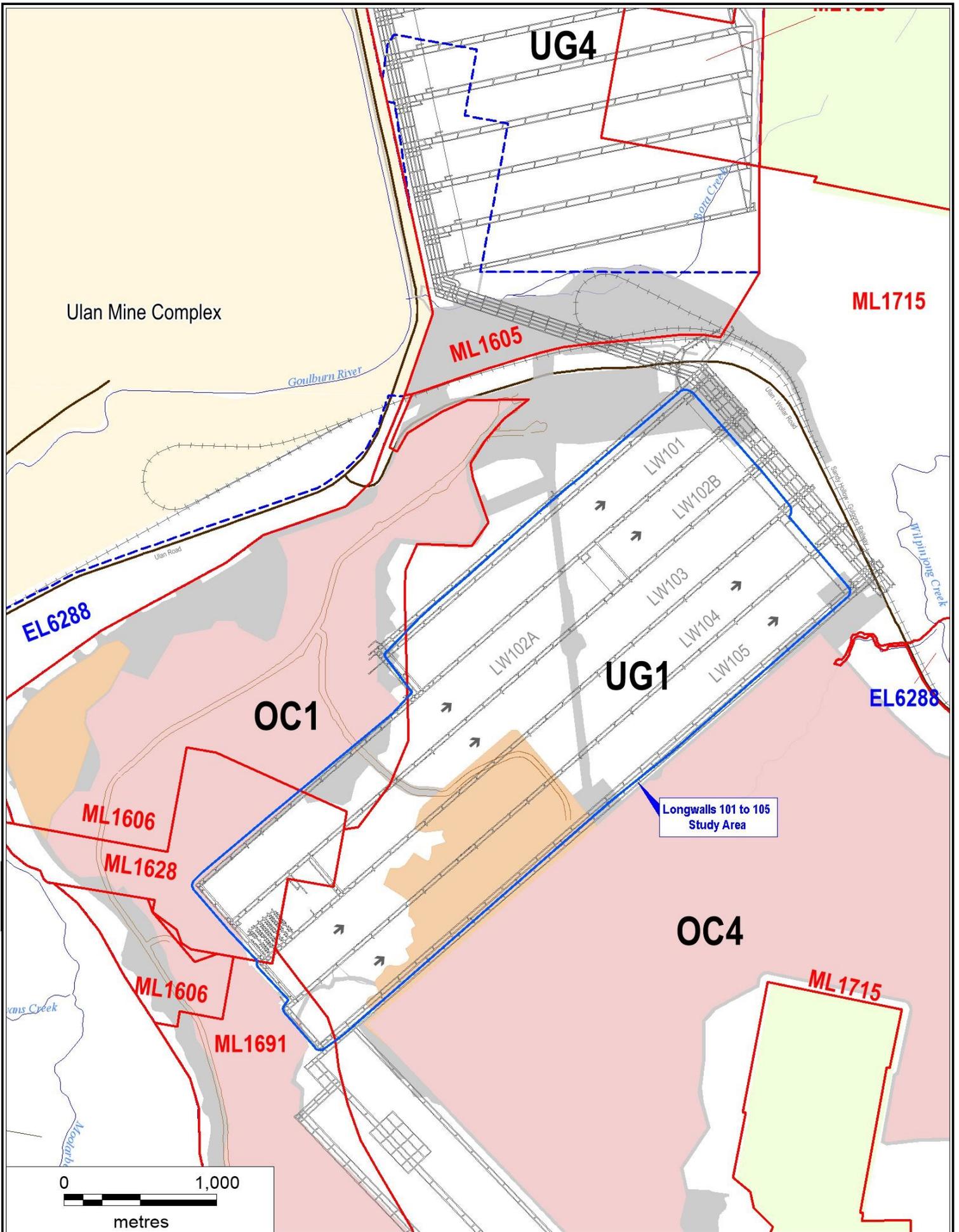
-  Open Cut Mining Area
-  Underground Workings
-  Out-of-Pit Emplacement
-  Surface Infrastructure

-  Longwalls 101 to 105 Study Area
-  Direction of Longwall Mining



Figure 2

Moolarben Coal Complex Layout



- Legend**
- Exploration Licence Boundary
  - Mining Lease Boundary
  - Haul Road
  - Rail Line
  - Watercourse

- Existing / Approved Development**
- Open Cut Mining Area
  - Underground Workings
  - Out-of-Pit Emplacement
  - Surface Infrastructure

- Longwalls 101 to 105 Study Area
- Direction of Longwall Mining



Figure 3  
UG1 Longwalls 101-105 Layout

## 1.1 PURPOSE AND SCOPE

This UG1 Longwalls 101 to 105 Public Safety Management Plan (LW101-105 PSMP) forms a part of the Extraction Plan being developed for Longwalls 101 to 105 (herein referred to as Longwalls 101-105) of the approved UG1 Underground Mine. This LW101-105 PSMP has been prepared by MCO, with input from Mine Subsidence Engineering Consultants [MSEC], to satisfy the requirements of Project Approval (08\_0135) 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.

**Purpose:** This LW101-105 PSMP outlines the management of potential consequences on public safety resulting from the extraction of Longwalls 101-105.

**Scope:** This LW101-105 PSMP covers areas within and proximal to the Longwalls 101-105 Study Area<sup>1</sup> (Figure 3).

Longwalls 101-105 form the UG1 Underground Mine at the Moolarben Coal Complex.

This amendment has been prepared to incorporate the final two longwalls panels 104 and 105 of the UG1 mining area into the Extraction Plan. The only mine plan alteration from that approved under the Stage 2 Project Approval (08\_0135) is the shortening of the commencing end of LW104 by 70m, which was conducted to facilitate the installation of a rear panel ventilation shaft and associated roadway.

Owners of public infrastructure on land within the Longwalls 101-105 Study Area and surrounds have also been consulted with separately as part of the UG1 Longwalls 101 to 105 Built Features Management Plans (LW101-105 BFMPs), including Essential Energy, TransGrid, Mid-Western Regional Council (MWRC), Telstra and Australian Rail Track Corporation (ARTC).

A list of the key responsibilities of MCO personnel in relation to this LW101-105 PSMP, and a list of key contacts, is provided in Section 11.

## 1.2 STRUCTURE OF THE LONGWALLS 101-105 PSMP

The remainder of the LW101-105 PSMP is structured as follows:

**Section 2** Describes the review and update of the LW101-105 PSMP.

**Section 3** Outlines the statutory requirements applicable to the LW101-105 PSMP.

<sup>1</sup> Longwalls 101-105 and the area of land within the furthest extent of the 26.5 degree (°) angle of draw and 20 millimetres (mm) predicted subsidence contour.

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- 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 LW101-105 PSMP.

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## 2.0 PUBLIC SAFETY MANAGEMENT PLAN REVIEW AND UPDATE

In accordance with Condition 5, Schedule 6 of Project Approval (08\_0135), this LW101-105 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 or MP 05\_0117 (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. 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 6 of Project Approval (08\_0135), MCO will make the approved LW101-105 PSMP publicly available on the MCO website.

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### 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 LW101-105 PSMP are described below.

#### 3.1 EP&A ACT APPROVAL

Condition 5(l), Schedule 4 of Project Approval (08\_0135) (as modified) requires the preparation of a Public Safety Management Plan (i.e. this LW101-105 PSMP) as a component of the Extraction Plan. In addition, Conditions 5(n), 5(p) and 6, Schedule 4 and Condition 3, Schedule 6 of Project Approval (08\_0135) (as modified) outline general management plan requirements that are applicable to the preparation of this LW101-103 PSMP.

Table 1 presents these requirements and indicates where they are addressed within this LW101-105 PSMP.

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**Table 1: Management Plan Requirements**

Project Approval (08_0135) Condition	LW101-105 PSMP Section
<p><b>Condition 5, Schedule 4</b></p> <p>5. 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:</p> <p>...</p> <p>(l) include a Public Safety Management Plan, which has been prepared in consultation with DRE, to ensure public safety in the mining area;</p> <p>...</p> <p>(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;</p> <p>...</p> <p>(p) include a program to collect sufficient baseline data for future Extraction Plans.</p>	<p>This document</p> <p>Section 10</p> <p>Section 12</p>
<p><b>Condition 6, Schedule 4</b></p> <p>6. The Proponent shall ensure that the management plans required under conditions 5(g)-(l) above include:</p> <p>(a) an assessment of the potential environmental consequences of the Extraction Plan incorporating any relevant information that has been obtained since this approval; and</p> <p>(b) a detailed description of the measures that would be implemented to remediate predicted impacts.</p>	<p>Sections 7.5</p> <p>Section 8</p>
<p><b>Condition 3, Schedule 6</b></p> <p>3. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:</p> <p>(a) detailed baseline data</p> <p>(b) a description of:</p> <ul style="list-style-type: none"> <li>• the relevant statutory requirements (including any relevant approval, licence or lease conditions);</li> <li>• any relevant limits or performance measures/criteria;</li> <li>• 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;</li> </ul> <p>(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;</p> <p>(d) a program to monitor and report on the:</p> <ul style="list-style-type: none"> <li>• impacts and environmental performance of the project;</li> <li>• effectiveness of any management measures (see c above)</li> </ul> <p>(e) a contingency plan to manage any unpredicted impacts and their consequences;</p> <p>(f) a program to investigate and implement ways to improve the environmental performance of the project over time;</p> <p>(g) a protocol for managing and reporting any:</p> <ul style="list-style-type: none"> <li>• incidents;</li> <li>• complaints;</li> <li>• non-compliances with statutory requirements; and</li> <li>• exceedances of the impact assessment criteria and/or performance criteria; and</li> </ul> <p>(h) a protocol for periodic review of the plan.</p>	<p>Section 4.1</p> <p>Section 3</p> <p>Section 6</p> <p>Section 9</p> <p>Sections 8 and 10</p> <p>Sections 7 and 13</p> <p>Section 10</p> <p>Section 7 and 13</p> <p>Section 14</p> <p>Section 15</p> <p>Section 16</p> <p>Sections 9 and 10</p> <p>Section 2</p>

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### 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.

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## 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:

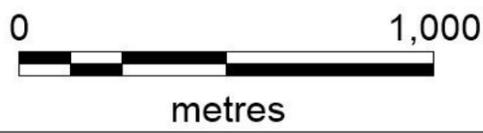
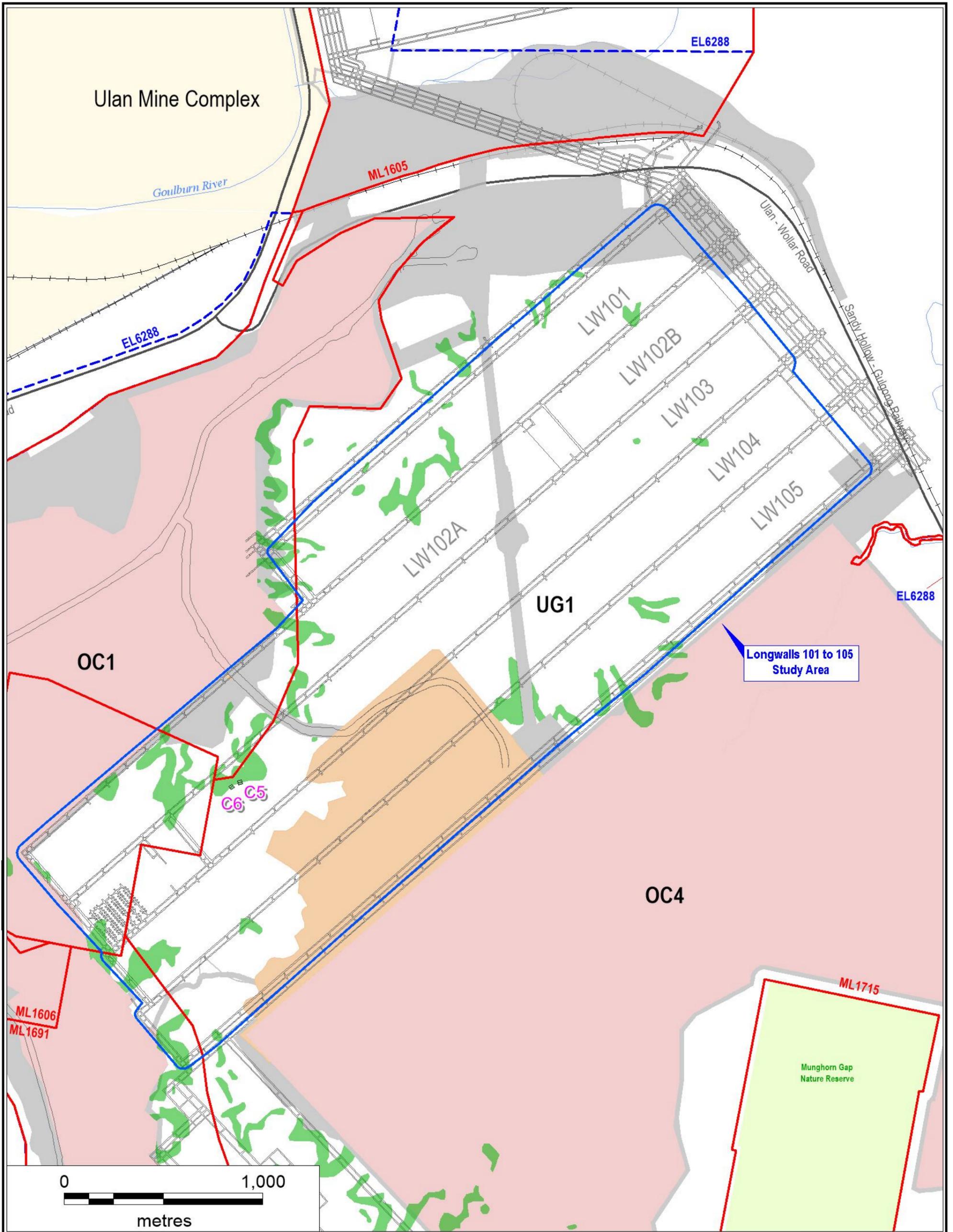
- UG1 Longwalls 101-105 Land Management Plan (LW101-105 LMP) which outlines the management of potential environmental consequences on cliffs, minor cliffs, rock face features, steep slopes and land in general; and
- UG1 Longwalls 101-105 Built Features Management Plans (LW101-105 BFMPs) which describe potential consequences on surface infrastructure. LW101-105 BFMPs have been prepared for the following infrastructure owners and assets:
  - Essential Energy assets (e.g. 66 kilovolt (kV)/22 kV dual circuit powerline supported on timber poles and proposed substation);
  - TransGrid assets (e.g. 330 kV electricity transmission line (ETL) and tower structures);
  - MWRC assets (e.g. Ulan-Wollar Road including road pavement, embankments, tunnels and culverts, Murragamba Road, Carrs Gap Road, Ulan Road and bridge over Sandy Hollow Gulgong Railway, other access roads and four wheel drive tracks);
  - Telstra assets (e.g. optical fibre and copper cables); and
  - ARTC assets (e.g. Sandy Hollow Gulgong Railway).

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.

#### ***UG1 Longwalls 101-105 Land Management Plan***

Cliffs and steep slopes in the vicinity of Longwalls 101-105 are shown on Figure 4.

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<b>Legend</b>		<b>Existing / Approved Development</b>	<b>Longwalls 101 to 105 Study Area</b>
Exploration Licence Boundary	Open Cut Mining Area	Longwalls 101 to 105 Study Area	N
Mining Lease Boundary	Underground Workings	Clifflines and Steep Slopes	
Haul Road	Out-of-Pit Emplacement	Cliffs	<b>YANCOAL</b> 兗州煤業澳洲有限公司 <b>MOOLARBEN COAL</b>
Rail Line	Surface Infrastructure		
Watercourse			<b>Figure 4</b> <b>Cliffs and Steep Slopes</b>

## Cliffs

Project Approval (08\_0135) includes the following definition:

*Cliff:*

*A continuous rock face, including overhangs, having a minimum length of 20 metres, a minimum height of 10 metres and a minimum slope of 2 in 1 (>63.4°).*

Consistent with this definition, for the purposes of subsidence assessments, MSEC (2015; 2017) assessed cliffs as a continuous rock face having a minimum length of 20 metres (m), height of 10 m and a minimum slope of 2 to 1 (i.e. having a minimum angle to the horizontal of 63.4°).

Six cliffs (cliffs C1 to C6) were identified by MSEC (2015) within the UG1 Study Area (i.e. associated with Longwalls 101-105) as part of the Subsidence Assessment for the *UG1 Optimisation Modification Environmental Assessment* (UG1 Optimisation Modification). The locations of the cliffs were determined from site inspections and 2 m surface contours and are shown on Figure 4.

Of the cliffs identified within the UG1 Study Area, only cliffs C5 and C6 lie within the Longwalls 101-105 Study Area.

Cliffs C1, C2, C3 and C4 are located within the approved out-of-pit emplacement or surface infrastructure and no longer exist.

### *Minor Cliffs and Rock Face Features*

Project Approval (08\_0135) includes the following definitions:

*Minor cliff:*

*A continuous rock face, including overhangs, which has a:*

- *minimum length of 20 metres and a height between 5 metres and 10 metres, or maximum length of 20 metres and a minimum height of 10 metres; and*
- *minimum slope of 2 to 1 (>63.4°).*

*Rock face feature:*

*A continuous rock face, including overhangs, which has a:*

- *minimum length of 20 metres and a height between 3 metres and 5 metres, or maximum length of 20 metres and a minimum height of 5 metres; and*
- *minimum slope of 2 to 1 (>63.4°).*

MSEC (2015 and 2020) identified a number of overhangs and smaller cliffs (i.e. minor cliffs and rock face features) within the UG1 Study Area, which are referred to as rock ledges.

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### *Steep Slopes and Land in General*

Project Approval (08\_0135) includes the following definition:

*Steep slope:*

*An area of land having a gradient between 1 in 3 (33% or 18.3°) and 2 in 1 (200% or 63.4°).*

MSEC (2015) identified a number of steep slopes within the UG1 Study Area. Steep slopes were identified by MSEC as having a gradient of between 1 in 3 (i.e. having an angle to the horizontal of 18°) and 2 in 1 (i.e. having an angle to the horizontal of 63°) and were determined using 2 m contours of the UG1 Study Area.

Steep slopes have been identified to highlight areas where the existing ground slopes may be marginally stable. However, no significant slope failures have been observed in the Western or Southern Coalfields as a result of longwall mining (MSEC, 2017).

Land in general refers to the general landscape other than cliffs, minor cliffs, rock face features and steep slopes. Land in general includes other land features such as fire trails and vehicular tracks, however excludes surface features such as drains, diversions, and other MCO assets including the conveyor, open cut highwalls and out-of-pit emplacements which are addressed elsewhere in the Extraction Plan. Unsealed vehicular tracks and fire trails are located throughout the UG1 Study Area and above Longwalls 101-103.

### *Environmental Risk Assessment*

The Environmental Risk Assessment conducted for the LW101-103 LMP indicated that there was no change in the previously assessed risk to cliffs, minor cliffs, rock face features, steep slopes and land in general.

### **UG1 Longwalls 101-105 Built Features Management Plans**

Each of the LW101-105 BFMPs includes the collection of baseline data (e.g. by visual audit/inspection/survey) in relation to the integrity of the built features, considering safety, serviceability and the ability to repair.

Baseline subsidence survey and monitoring for each infrastructure asset is described in each of the LW101-105 BFMPs and outlined in the UG1 Longwalls 101 to 105 Subsidence Monitoring Program (LW101-105 SMP).

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Individual risk assessments were conducted with representatives of the asset owners and the outcomes and actions are summarised in the LW101-105 BFMPs. The original risk assessments were held on:

- UG1 Longwalls 101-103 Built Features Management Plan – Telstra (LW101-103 BFMP-Telstra) (15 March 2017);
- UG1 Longwalls 101-103 Built Features Management Plan – Essential Energy (LW101-103 BFMP-EE) (22 March 2017);
- UG1 Longwalls 101-103 Built Features Management Plan – Australian Rail Track Corporation (LW101-103 BFMP-ARTC) (23 March 2017); and
- UG1 Longwalls 101-103 Built Features Management Plan – TransGrid (LW101-103 BFMP-TransGrid) (24 March 2017).
- Each risk assessment was reviewed by MCO and MSEC personnel in January 2020.

At a meeting on 16 February 2017, MCO presented to representatives of the MWRC the predicted subsidence impacts and proposed monitoring programs, controls and contingencies relating to MWRC infrastructure within the vicinity of the Longwalls 101-103 Study Area. The MWRC was satisfied that a formal risk assessment workshop was not required for the UG1 Longwalls 101-103 Built Features Management Plan – Mid-Western Regional Council (LW101-103 BFMP-MWRC). The amended Built Feature Management Plan is prepared in consultation with the Mid-Western Regional Council.

The amended 103 and 104 panel layout to shorten the commencing end of LW103 and LW104 and include the 103 Plunge panel, does not change the risk level in relation to public safety.

### ***MCO Assets and Mine Infrastructure***

The MCO assets and mine infrastructure identified within the Longwalls 101-105 Study Area and surrounds include:

- remote services infrastructure area;
- open cut highwalls;
- out-of-pit waste rock emplacement;
- Stage 2 ROM facilities and conveyor;
- OC4 South-West Haul Road;
- access roads;
- fences; and

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- a surface dam.

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 101 to 105 are shown on Plan 7 in the LW101-105 SMP.

#### 4.2 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 101-105 Study Area) is mine-owned, with the exception of a parcel of land owned by The State of New South Wales (Crown Land) and a number of closed roads (and associated easements) owned by MWRC.

MCO has consulted with NSW Department of Industry – Lands (Crown Lands) in relation to the LW101-105 LMP and MWRC in relation to both the LW101-105 LMP and LW101-105 BFMP-MWRC.

#### 4.3 LONGWALLS 101-105 EXTRACTION SCHEDULE

Longwalls 101-105, 103 plunge panel 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 101-105 Study Area) are shown on Figure 3. Longwall extraction will occur from the west to the east. The longwall layout includes approximately 311 m panel widths (void) with 20 m pillars (solid).

The provisional extraction schedule for Longwalls 101-105 is provided in Table 2.

**Table 2: Provisional Extraction Schedule**

Panel	Estimated Start Date	Estimated Duration	Estimated Completion Date
101	-	-	Complete
102 (A+B)	-	-	Complete
103	-	9 months	June 2020
103 Plunge	-	-	Complete
104	July 2020	12 months	June 2021
105	July 2021	12 months	June 2022

Following approval of the UG1 Optimisation Modification in April 2016, MCO delineated a geological feature in Longwall 102 that prevent economic mining of this section, and has subsequently revised

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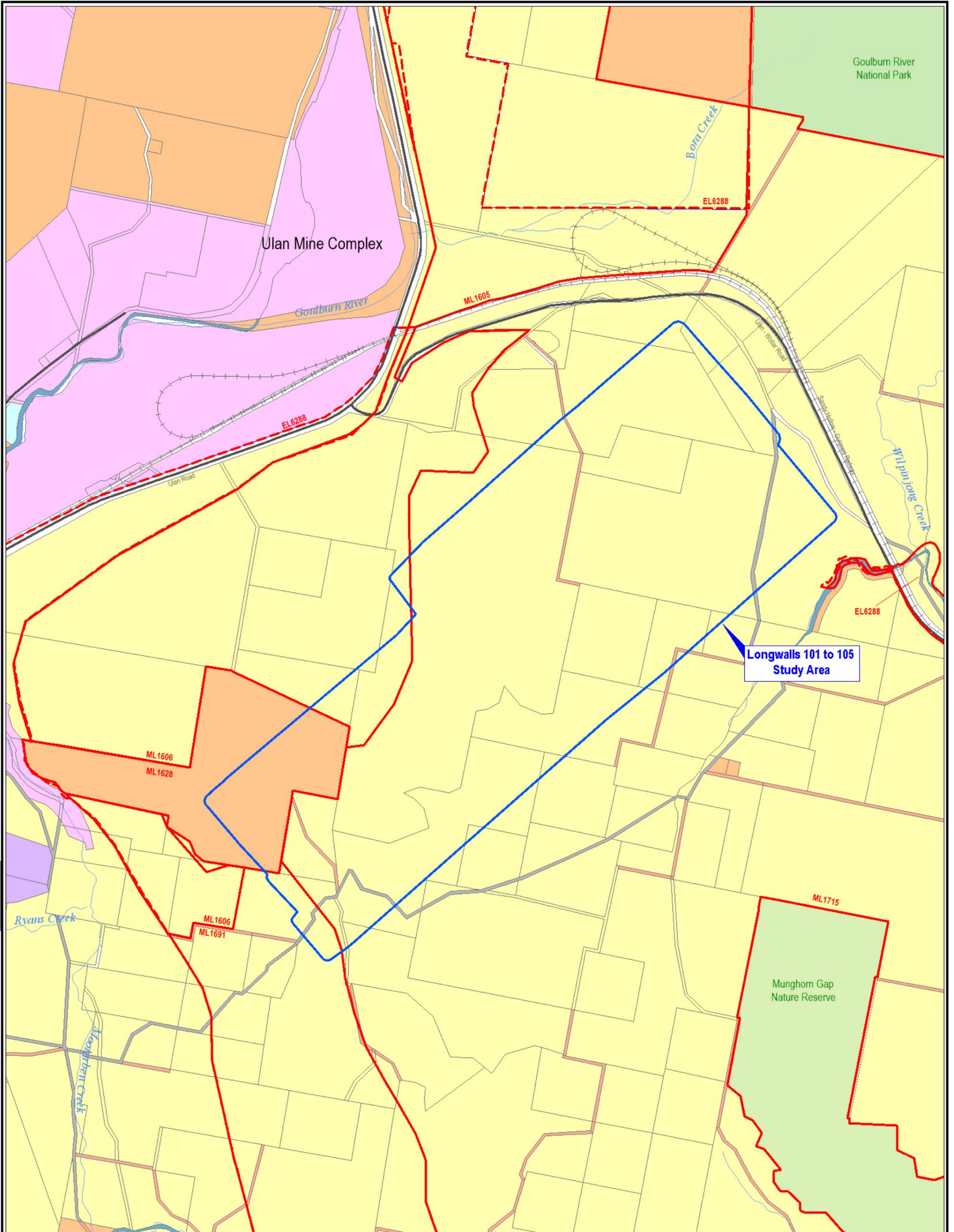
the longwall layout to incorporate a barrier pillar around this feature. The barrier pillar separating Longwalls 102A and 102B is approximately 140 m in length. In addition, following further detailed design, Longwalls 101-103 have been shortened by approximately 70 m to provide safe operational conveyor distance between the end of the longwalls and main headings.

A second geological intrusion has been located at the commencing end of LW103 preventing viable extraction by longwall mining methods in this area. As a consequence, the LW103 commencing position has been moved outbye of the influence of this structure, and a first workings and plunge panel has been established to partially extract the remanent coal that would otherwise become sterilised.

LW104 was also shortened by 70 m at the commencing end to allow for a rear of panel shaft.

With the exception of these changes, the longwall geometry is the same as that for the approved UG1 Optimisation Modification, and MSEC (2017, 2019, and 2020) conclude that the overall impact assessments for the natural and built features are unchanged or reduced.

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- Legend**
- Exploration Licence Boundary
  - Mining Lease Boundary
  - Rail Line
  - Watercourse
  - Longwalls 101 to 105 Study Area

- Crown
- Moolarben Coal Operations Pty Ltd
- Privately Owned

- Ulan Coal Mines Limited
- National Park / Nature Reserve
- Commercial



**Figure 5**  
**Land Ownership**  
**in the Vicinity of Longwalls 101 to 105**

## 5.0 RISK ASSESSMENT

In accordance with the draft *Guidelines for the Preparation of Extraction Plans* (DP&E and DRE, 2015), a risk assessment meeting was held on 21 April 2017 to identify and address potential safety hazards to the public for LW101 to 103 including:

- potential subsidence impacts on built features;
- potential instability of cliffs, minor cliffs, rock face features or steep slopes caused by subsidence;
- deformations or fracturing of any land caused by subsidence; and
- any other impacts of subsidence.

Attendees at the risk assessment meeting included representatives from MCO (including the Underground Technical Manager and Environmental and Community Manager), MSEC and a risk assessment facilitator.

A subsequent risk assessment was conducted for the 103 Plunge Panel on the 3 December 2019. This concluded that no further risk controls measure to that covered by the Public Safety Management Plan were required, as the 103 Plunge Panel reduces surface impact over that originally considered and approved.

A risk assessment was also conducted for LW104-105 on the 29<sup>th</sup> January 2020. No new management requirements were identified and it was determined existing management and monitoring systems could be extended for LW104 and 105

The risk assessment/s included consideration of the environmental risk assessment relevant to the LW101-105 LMP and the risk assessments conducted for the LW101-105 BFMPs with the relevant infrastructure owners (Section 4.1).

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

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

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## 6.0 PERFORMANCE MEASURES

The performance measure specified in Table 19, Schedule 4 of Project Approval (08\_0135) relevant to the public safety, is listed in Table 3.

**Table 3: Public Safety Subsidence Impact Performance Measure**

Feature	Subsidence Impact Performance Measure
<b>Public Safety</b>	
Public safety	Negligible additional risk

Source: Table 19 in Schedule 4 of Project Approval (08\_0135).

In accordance with Condition 3, Schedule 4 of Project Approval (08\_0135), MCO must ensure that there is no exceedance of the performance measures listed in Table 19, Schedule 4 to the satisfaction of the Secretary.

Section 7 outlines the monitoring that will be undertaken to assess the impact of Longwalls 101-105 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.

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## 7.0 MONITORING

The components of the program to monitor subsidence parameters are illustrated in Plan 7 (LW101-105 SMP [Appendix G of the UG1 Longwalls 101 to 105 Extraction Plan]) 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 LW101-105 SMP.

### 7.1 CLIFFS

A monitoring program will be implemented to monitor subsidence and the impacts on cliffs, and environmental performance during extraction of Longwalls 101-105, as outlined in the LW101-105 LMP.

The monitoring program includes:

- measurement of subsidence parameters as outlined in the LW101-105 SMP; and
- monitoring of subsidence impacts on specific cliffs (C5 and C6) as discussed below.

Visual inspections of cliffs C5 and C6 will be conducted prior to commencement of secondary extraction of Longwalls 101 and 103, and following the completion of Longwall 103. Opportunistic observations of subsidence impacts to these cliffs will also be conducted during routine works by MCO and its contractors.

If additional subsidence impact(s) (i.e. cliff instabilities) 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 cliff instability (i.e. freshly exposed rock face and debris scattered around the base of the cliff) relative to the cliff face;
- the nature and extent of the cliff instability (including an estimate of volume);
- the length of the cliff instability;
- other relevant aspects such as water seepage (which can indicate weaknesses in the rock);

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- 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.

The information will be recorded in the Subsidence Impact Register and reported in accordance with Project Approval (08\_0135) conditions. Recording of the monitoring results in the Subsidence Impact Register will assist MCO in monitoring compliance with the subsidence impact performance measures.

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

## 7.2 MINOR CLIFFS, ROCK FACE FEATURES, STEEP SLOPES AND LAND IN GENERAL

A monitoring program will be implemented to monitor subsidence and the impacts on minor cliffs, rock face features, steep slopes and land in general, and environmental performance during extraction of Longwalls 101-105, as outlined in the LW101-105 LMP.

The monitoring program includes:

- measurement of subsidence parameters as outlined in the LW101-105 SMP; and
- monitoring of subsidence impacts on representative land features as discussed below.

A visual inspection of representative land features (i.e. minor cliffs, rock face features, steep slopes and land in general) within the Study Area will be conducted prior to Longwall 101 to establish a baseline record.

Opportunistic observations of subsidence impacts to such land features will be conducted during routine works by MCO and its contractors. Where relevant, inspections of subsidence impacts will include detailed measurement and photographic record of the impact for comparison with baseline records.

If additional subsidence impact(s) are observed during an inspection, the total face area of any minor cliffs, rock face features and steep slopes that experience minor environmental consequences (i.e. rockfalls, displacement of or dislodgement of boulders or slabs, or fracturing) will be recorded.

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The information will be recorded in the UG1 Longwalls 101-105 Land Management Plan – Subsidence Impact Register and reported in accordance with Project Approval (08\_0135) conditions. Recording of the monitoring results in the UG1 Longwalls 101-105 Land Management Plan – Subsidence Impact Register will assist MCO in monitoring compliance with the subsidence impact performance measures.

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

### 7.3 BUILT FEATURES

Each of the LW101-105 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:

- 66 kV/22 kV dual circuit powerline on timber poles and proposed Essential Energy substation (to be located at the Remote Services Facilities) (LW101-105 BFMP-EE);
- 330 kV ETL and towers (LW101-105 BFMP-TRANSGRID);
- Ulan-Wollar Road including road pavement, embankments, tunnels and culverts (LW101-105 BFMP-MWRC);
- telecommunication (optical fibre and copper) cables (LW101-105 BFMP-TELSTRA); and
- Sandy Hollow Gulgong Railway (LW101-105 BFMP-ARTC).

The LW101-105 SMP also includes consideration of the following infrastructure assets, as well as MCO assets discussed in Section 7.4:

- Ulan-Wollar Road (closed and inaccessible to the public)<sup>2</sup>;
- Murragamba Road and Carrs Gap Road (closed and inaccessible to the public)<sup>3</sup>;
- Ulan Road and bridge over the Sandy Hollow Gulgong Railway; and
- survey control marks (e.g. Murragamba Trig Station).

<sup>2</sup> The route of Ulan-Wollar Road from the intersection with Ulan Road and around the northern end of Longwalls 101-103 has been realigned. The former road alignment has been closed to the public at both ends. A portion of the previous road alignment is currently under application to be officially closed,

<sup>3</sup> Murragamba Road and Carrs Gap Road overly Longwalls 101 to 105, as these roads are closed to the public, they have not been considered further.

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## 7.4 MOOLARBEN COAL OPERATION ASSETS

The MCO assets and mine infrastructure identified within the Longwalls 101-105 Study Area and surrounds include:

- open cut highwalls;
- out-of-pit waste rock emplacement;
- Stage 2 ROM facilities and conveyor;
- OC4 South-West Haul Road;
- access roads;
- fences; and
- surface dams.

Monitoring of the “BC” line (i.e. OC1 highwall) will include scanning during mining by the open cut surveyors.

The approved out-of-pit waste rock emplacement area is located within the Longwalls 101-105 Study Area, predominantly above the Longwalls 104 and 105. The top of the approved out-of-pit waste rock emplacement is proposed to be relatively flat with a top surface level of approximately 530 m to 540 m Australian Height Datum (AHD). The slopes of the batters formed at the sides of the emplacement area are proposed to vary from grades of approximately 1 in 4 to 1 in 6, however, because the natural surface levels surrounding the emplacement in the Study Area are close to the proposed finishing level (530 m to 540 m AHD) there will be minimal to no batters.

The Stage 2 ROM Facilities have been constructed outside the Longwalls 101-105 Study Area and are located adjacent to the maingate of Longwall 105. Ancillary infrastructure is located above LW105 including fire fighting water tanks. The conveyor from the Stage 2 ROM Facilities to the CHPP has been constructed and is aligned diagonally across Longwalls 101-105 and includes an access road adjacent to the conveyor.

The OC4 South-West Haul Road is located above Longwalls 102A, 103, 104 and 105.

Visual inspections of mine infrastructure and assets will be conducted opportunistically by MCO as described in the LW101-105 SMP.

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## 7.5 ENVIRONMENTAL CONSEQUENCES

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.

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## 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 will be reported in the Annual Review.

### 8.1 RESTRICTED PUBLIC ACCESS

With the exception of a portion of land (Lot 7010, DP1025345) owned by The State of NSW (Crown Land) and a number of closed roads (and associated easements) owned by Crown Lands and MWRC, all other land (including farm land and facilities) within the Longwalls 101-103 Study Area is owned by MCO.

Therefore, accessibility to the general public is restricted to the Longwalls 101-105 Study Area by the fencing and locked gates.

Access to surface areas subject to subsidence impacts will be controlled by Open-Cut Mining Supervisors and 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, minor cliffs, rock face features, steep slopes and land in general) resulting from the extraction of Longwalls 101-105. Potential management measures that will be considered to mitigate/remediate environmental consequences are detailed in the LW101-105 LMP, and include:

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

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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 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 BUILT FEATURES MANAGEMENT PLANS

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 LW101-105 BFMP.

Each LW101-105 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:

- 66 kV/22 kV dual circuit powerline on timber poles and proposed Essential Energy substation (LW101-105 BFMP-EE);
- 330 kV electricity transmission line and towers (LW101-105 BFMP-TRANSGRID);
- public roads and associated infrastructure (e.g. Ulan-Wollar Road pavement, embankments, tunnels and culverts) (LW101-105 BFMP-MWRC);
- telecommunication (optical fibre and copper) cables (LW101-105 BFMP-TELSTRA); and
- Sandy Hollow Gulgong Railway (LW101-105 BFMP-ARTC).

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

- traffic control including diversion of traffic;
- temporary speed restrictions;
- warning signs/lights;

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- restriction of public access;
- erection of barriers;
- implementation of security services; and
- use of emergency services for public control.

#### 8.4 OTHER LANDOWNERS

With the exception of a portion of land (Lot 7010, DP1025345) and road reserves owned by The State of NSW (Crown Land) and a number of closed roads (and associated easements) owned by MWRC, all other land (including farm land and facilities) within the Longwalls 101-105 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 the landowner.

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## 9.0 ASSESSMENT OF PERFORMANCE INDICATORS AND MEASURES

In accordance with Condition 5(d), Schedule 4 of Project Approval (08\_0135), performance indicators have been developed for the performance measure listed in Table 3 (Section 6).

MCO will assess Longwalls 101-105 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 LW101-105 BFMPs.

Monitoring conducted to inform the assessment of secondary extraction of Longwalls 101-105 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 LW101-105 PSMP will be implemented.

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## 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 Environmental and Community Manager within 24 hours.
- The observation will be recorded in the Subsidence Impact Register (LW101-105 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 Resources Regulator.
- This LW101-105 PSMP and the performance indicators will be reviewed to adequately manage future potential impacts within the limits of Project Approval (08\_0135).

### 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.

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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).

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## 11.0 ROLES AND RESPONSIBILITIES

Key responsibilities of MCO personnel in relation to this LW101-105 PSMP are summarised in Table 4. Responsibilities may be delegated as required.

**Table 4: Longwalls 101 to 105 Public Safety Management Plan Responsibility Summary**

Responsibility	Task
<b>General Manager</b>	<ul style="list-style-type: none"> <li>Ensure resources are available to MCO personnel to facilitate the completion of responsibilities under this LW101-105 PSMP.</li> </ul>
<b>Underground Technical Manager</b>	<ul style="list-style-type: none"> <li>Ensure the LW101-105 SMP is implemented.</li> <li>Ensure monitoring required under this LW101-105 PSMP is: carried out within specified timeframes, adequately checked and processed and prepared to the required standard.</li> <li>Undertake relevant monitoring and implementation of management measures summarised in Sections 7 and 8 respectively.</li> </ul>
<b>Environmental and Community Manager</b>	<ul style="list-style-type: none"> <li>Ensure the LW101-105 PSMP is implemented.</li> <li>Liaise with relevant stakeholders regarding subsidence impact management and related environmental consequences.</li> </ul>
<b>Registered Mine Surveyor</b>	<ul style="list-style-type: none"> <li>Undertake all subsidence monitoring to the required standard within the specified timeframes and ensure data are adequately checked, processed and recorded.</li> </ul>

### 11.1 KEY CONTACTS

The details of key contacts and phone numbers in relation to this LW101-105 PSMP are summarised in Table 5.

**Table 5: Longwalls 101 to 105 Public Safety Management Plan Key Personnel Contact Details**

Organisation	Position	Contact Name	Phone Number
MCO	Underground Technical Manager	Mr Liam Mildon	02 6376 1614
	Environmental and Community Manager	Mr Graham Chase	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

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## 12.0 FUTURE EXTRACTION PLANS

In accordance with Condition 5(p), Schedule 4 of Project Approval (08\_0135) (as modified), MCO will collect baseline data for the 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 LW101-105 PSMP, will inform the appropriate type and frequency of monitoring of the assets relevant to the next Extraction Plan.

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## 13.0 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

### 13.1 ANNUAL REVIEW

In accordance with Condition 4, Schedule 6 of Project Approval (08\_0135) (as modified), MCO will conduct an Annual Review of the environmental performance of the Project by the end of March each 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 6 of Project Approval (08\_0135), the Annual Review will be made available on the MCO website.

As described in Section 2, this LW101-105 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.

In accordance with Condition 8, Schedule 6 of Project Approval (08\_0135) (as modified), MCO will also provide regular reporting on the environmental performance of the Project on the MCO website.

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## 13.2 AUDITS

In accordance with Condition 9, Schedule 6 of Project Approval (08\_0135) (as modified), an independent environmental audit was conducted by the end of December 2015 and 2018, and will be undertaken every three years thereafter. 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 (08\_0135), and any other relevant approvals, and recommend measures or actions to improve the environmental performance of the Project.

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## 14.0 INCIDENTS

An incident is defined in Project Approval (08\_0135) (as modified) 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 (08\_0135) (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 6 of Project Approval (08\_0135) (as modified).

MCO will notify the Secretary of DPIE and any other relevant agencies of any incident associated with the UG1 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 UG1, 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.

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## 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 6 of Project Approval (08\_0135) (as modified), the complaints register will be updated monthly and made available on the MCO website.

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## 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 (08\_0135), 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 2018, and will be 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.

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## 17.0 REFERENCES

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 Advice (2019), *Geotechnical Evaluation of Proposed Taking of Unsupported Plunges in LW103A Block*

Mine Subsidence Engineering Consultants (2015) *Subsidence Assessment (MSEC Report MSEC731 Revision A, June 2015)*, Appendix A in Moolarben Coal Operations Pty Ltd (2015) *Moolarben Coal Complex UG1 Optimisation Modification Environmental Assessment*.

Mine Subsidence Engineering Consultants (2017) *Moolarben Coal Complex: Moolarben Project Stage 2 – Longwalls 101 to 103 – Subsidence Predictions and Impact Assessments for the Natural and Built Features in Support of the Extraction Plan*. Report number MSEC867.

Mine Subsidence Engineering Consultants (2019) *Modified Commencing End of LW103 and Proposed 103A Workings* Report number MSEC103.

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