YANCOAL
兖煤澳大利亚有限公司
MOOLARBEN COAL

UG4 LONGWALLS 409 TO 414 LAND MANAGEMENT PLAN

Version	Issue Date *(Month/YYYY)*	Revision Detail *(Include the main areas reviewed, trigger / why the change)*	Author(s)	Review Team
1	October 2024	Original LMP for the UG4 Longwalls 409-414 Extraction Plan	MCO	MCO
2	January 2025	Updated to Address Agency Consultation	MCO	MCO
3	April 2026	Updated in response to Comments from the IEAPM	MCO	MCO

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1.0 INTRODUCTION

The Moolarben Coal Complex is an open cut and underground coal mining operation located approximately 40 kilometres (km) 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. MCO is a wholly owned subsidiary of Yancoal Australia Limited.

The UG4 Underground Mine (UG4) is a component of the approved Moolarben Coal Complex (**Figure 2**). First workings for UG4 commenced in October 2020 (**Figure 3**). Secondary extraction in UG4 of the first Longwall (LW) 401 commenced in July 2022. LW401 to 407 were completed in January 2026. The extraction of LW409 to 414 (hereafter referred to as LW409-414) within UG4 is scheduled to commence in September 2026.

Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038 and 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).

1.1 PURPOSE AND SCOPE

This UG4 Longwalls 409 to 414 Land Management Plan (LW409-414 LMP) has been prepared to satisfy the requirements of Condition 77(j), Schedule 3 of Project Approval (05_0117) for the management of potential impacts to watercourses and aquifers due to secondary extraction of LW409-414.

This LW409-414 LMP forms a part of the Extraction Plan developed for LW409-414 of the approved UG4. This LW409-414 LMP has been prepared by MCO, with input from suitably qualified experts (i.e. Mine Subsidence Engineering Consultants [MSEC]), to satisfy the requirements of Project Approval (05_0117) (as modified) and the *Extraction Plan Guideline* (NSW Department of Planning and Environment [DPE], 2022).

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 Department of Planning, Housing and Infrastructure (DPHI) on 9 May 2024 (**Attachment 2** of the Extraction Plan).

Purpose: This LW409-414 LMP outlines the management of potential environmental consequences on land in general and cliffs resulting from the extraction of LW409-414.

Scope: This LW409-414 LMP covers land associated with or in the vicinity of the LW409-414 Study Area[1] included land in general and cliffs (**Figure 4**).

[1] The LW409-414 Study Area is identified as the area of land within the furthest extent of the 26.5 degree (°) angle of draw and 20 millimetre (mm) predicted subsidence contour.

Figure 1: Regional Location

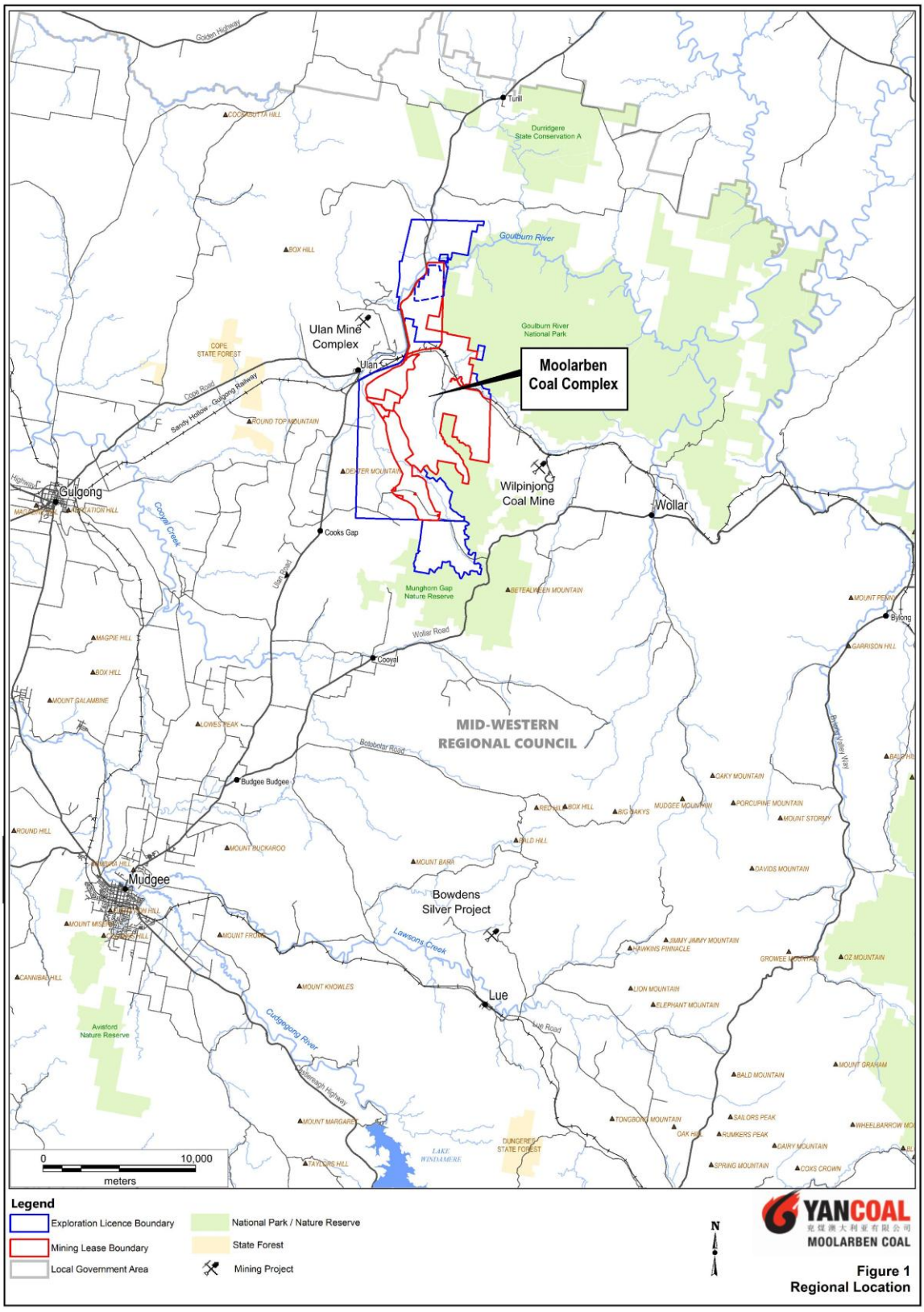

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Figure 2: Moolarben Coal Complex Layout

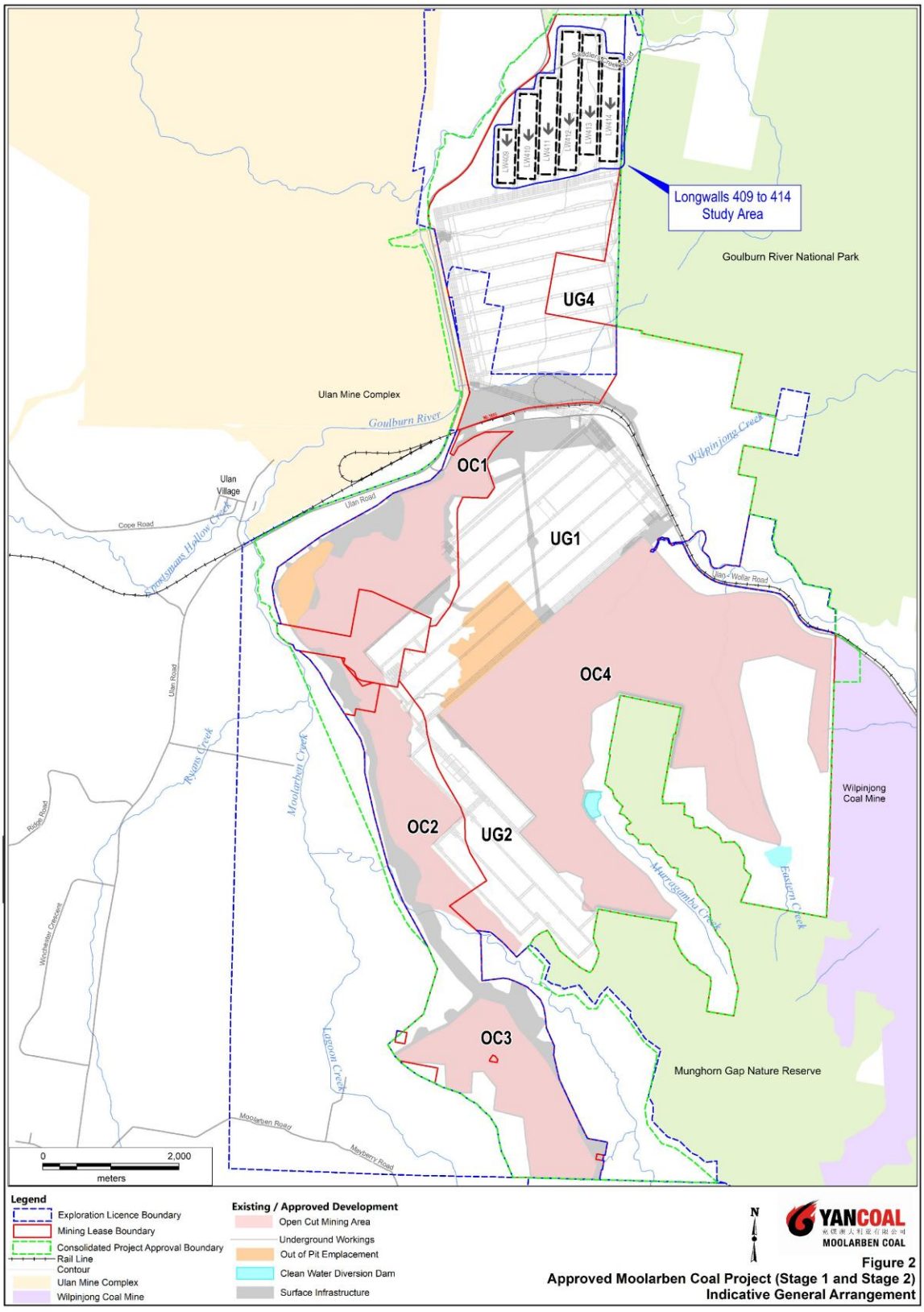


Figure 3: UG4 Longwalls 409 to 414 Layout

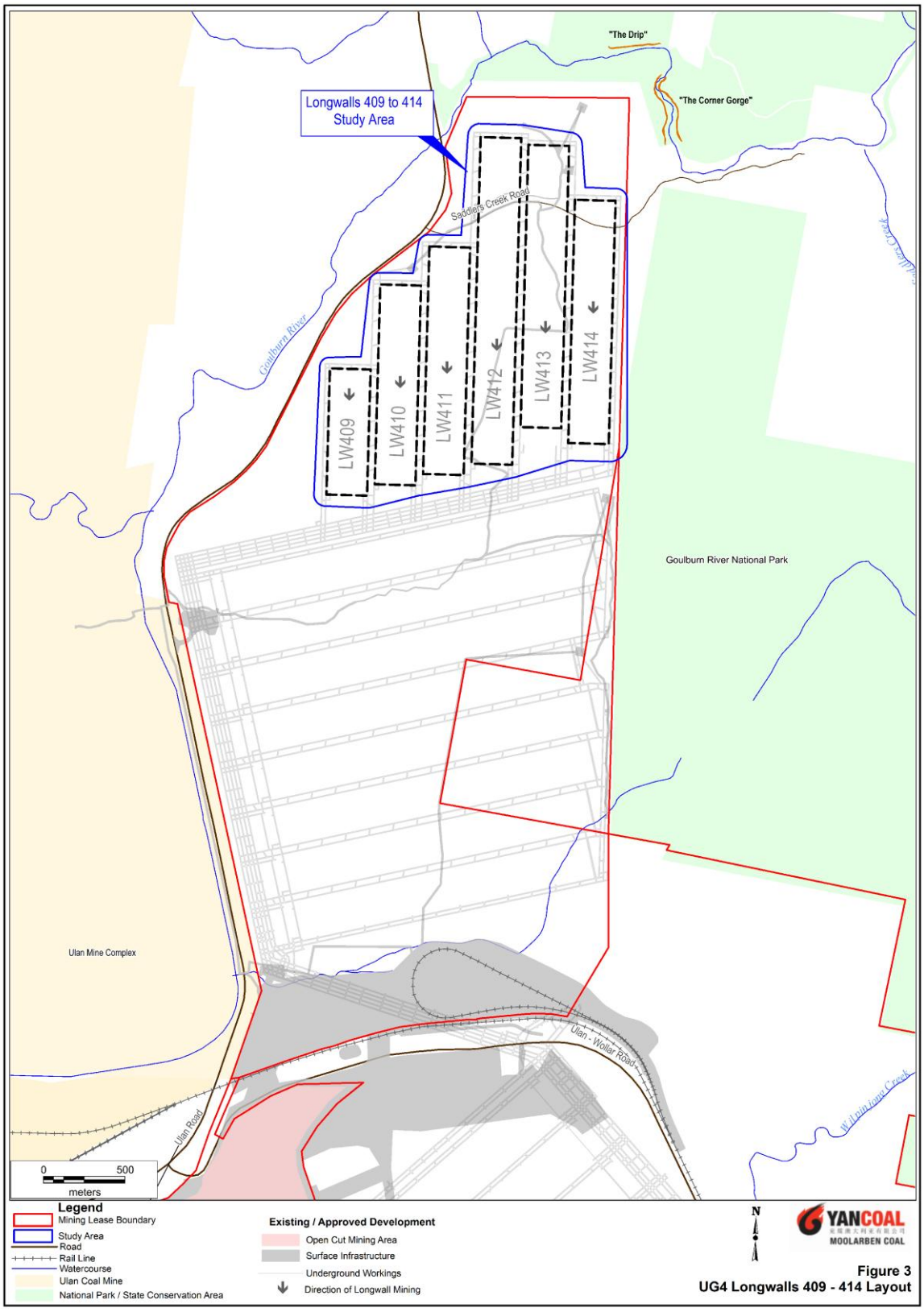


Figure 4: Natural Features within and in the vicinity of the Study Area

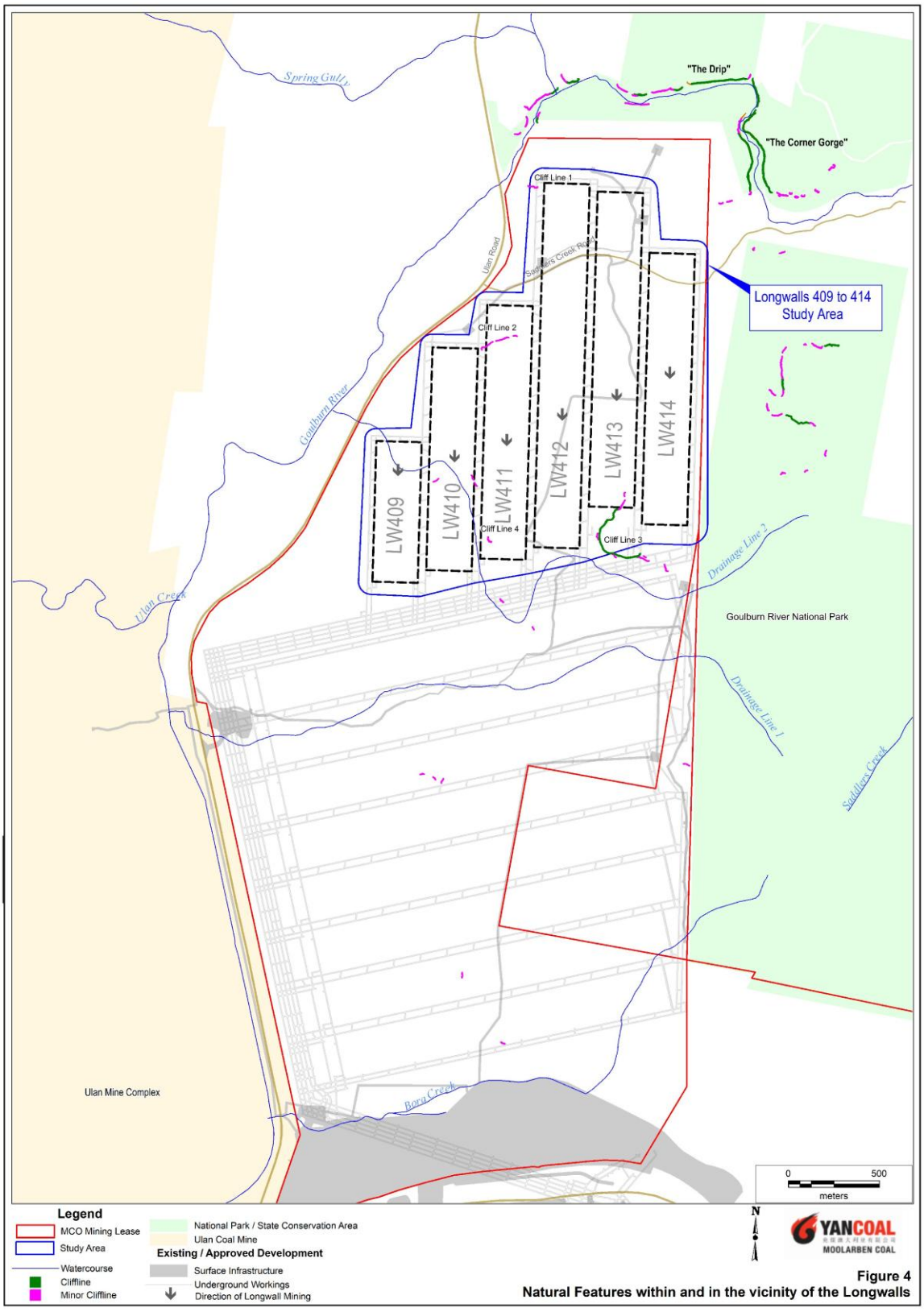


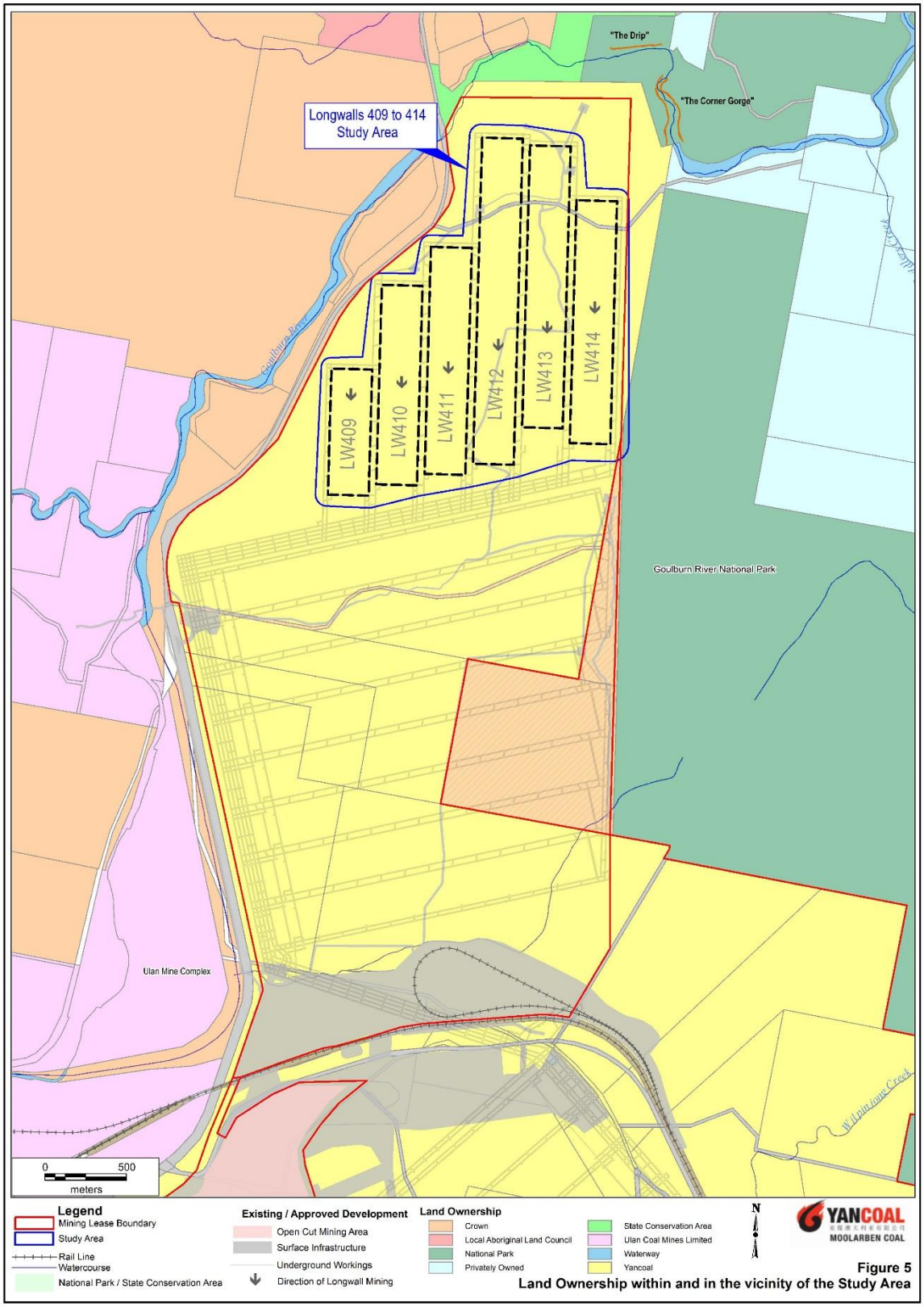
Figure 4
Natural Features within and in the vicinity of the Longwalls

Management of potential impacts to the Drip and Corner Gorge due to secondary extraction of LW409-414 is detailed in the *UG4 Longwalls 409 to 414 Drip, Corner Gorge and Goulburn River Monitoring and Reporting Program* (the Monitoring Program), which is provided as **Appendix H** of the LW409-414 Extraction Plan. Where there is any overlap in monitoring or management measures in this LW409-414 LMP with the Monitoring Program, the measures described in the Monitoring Program will supersede them.

Saddlers Creek Road and Telstra-owned copper cables that run along Saddlers Creek Road are the only public utilities or privately owned built features that are located within the Study Area. All other public utilities and privately owned built features are located outside of the Study Area. Owners of public utilities and privately-owned built features on land outside and within the LW409-414 Study Area have been consulted with separately as part of the UG4 LW409-414 Built Features Management Plans (LW409-414 BFMPs); including Mid-Western Regional Council (MWRC), Telstra and DPHI – Crown Lands (Crown Lands).

Crown Lands own some portions of land within the LW409-414 Study Area (including a triangle section of Crown Land in the south-east corner and Saddlers Creek Road corridor, which is managed by MWRC) (**Figure 5**). As such, MCO has consulted with Crown Lands as a potentially affected public authority. MCO has existing licences, consents and agreements with Crown Lands covering the approved activities within the Study Area. All other land within the LW409-414 Study Area is owned by MCO.

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



1.2 STRUCTURE OF THE LONGWALLS 409 TO 414 LAND MANAGEMENT PLAN

The remainder of the LW409-414 LMP is structured as follows:

Section 2 Describes the review and update of the LW409-414 LMP.

Section 3 Outlines the statutory requirements applicable to the LW409-414 LMP.

Section 4 Summarises the predicted subsidence impacts and environmental consequences resulting from the secondary extraction of LW409-414.

Section 5 Details the performance measures and indicators that will be used to assess environmental performance in relation to land in general over time.

Section 6 Describes the monitoring program.

Section 7 Describes the potential management measures that could be implemented to remediate any identified impacts to land features.

Section 8 Provides a Contingency Plan to manage any unpredicted impacts and their consequences and describes the Trigger Action Response Plan (TARP) management tool.

Section 9 Describes the Annual Review, audits, regular reporting, improvement of environmental performance and the program to collect sufficient baseline data for future Extraction Plans.

Section 10 Outlines the management and reporting of incidents.

Section 11 Outlines the management and reporting of complaints.

Section 12 Outlines the management and reporting of non-compliances with statutory requirements.

Section 13 Lists the references cited in this LW409-414 LMP.

2.0 LONGWALLS 409 TO 414 LAND MANAGEMENT PLAN REVIEW AND UPDATE

In accordance with Condition 5, Schedule 5 of Project Approval (05_0117), this LW409-414 LMP will be reviewed as follows:

> *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 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 LW409-414 LMP publicly available on the Yancoal's website.

3.0 STATUTORY REQUIREMENTS

MCO's statutory obligations are contained in:

- the conditions of the Project Approval (05_0117) (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 Mining Leases (MLs) (i.e. ML 1605, ML 1606, ML 1628, ML 1691 and ML 1715); and
- other relevant legislation.

Obligations relevant to this LW409-414 LMP are described below.

3.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 APPROVAL

Condition 77(j), Schedule 3 of Project Approval (05_0117), requires the preparation of a Land Management Plan as a component of the Extraction Plan (i.e. this LW409-414 LMP). In addition, Conditions 77(n), 77(p) and 78, Schedule 3 and Condition 3, Schedule 5 of Project Approval (05_0117) outline general management plan requirements that are applicable to the preparation of this LW409-414 LMP.

Table 1 presents the relevant Project Approval requirements and indicates where they are addressed within this LW409-414 LMP.

Table 1: Land Management Plan Requirements

Project Approval (05_0117) Condition	LW409-414 LMP 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:	
...	
(j) include a Land Management Plan, which has been prepared in consultation with any affected public authorities, to manage the potential impacts and/or environmental consequences of the proposed second workings on land in general;	**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 14 and 15, or where any such exceedance appears likely;	**Section 8**
...	
(p) include a program to collect sufficient baseline data for future Extraction Plans.	**Section 9**
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 4 & 6.2**
(b) a detailed description of the measures that would be implemented to remediate predicted impacts.	**Section 7**

Table 1 (Continued): Land Management Plan Requirements

Project Approval (05_0117) Condition	LW409-414 LMP Section
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**
(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 5**
• *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 5**
(c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	**Section 7**
(d) a program to monitor and report on the:	**Sections 6 & 9**
• *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 8**
(f) a program to investigate and implement ways to improve the environmental performance of the project over time;	**Sections 6 & 8**
(g) a protocol for managing and reporting any:	
• *incidents;*	**Section 10**
• *complaints;*	**Section 11**
• *non-compliances with statutory requirements; and*	**Section 12**
• *exceedances of the impact assessment criteria and/or performance criteria; and*	**Section 8**
(h) a protocol for periodic review of the plan.	**Section 2**

3.2 OTHER LEGISLATION

MCO operates the Moolarben Coal Complex consistent with Project Approval (05_0117) (as modified) and Project Approval (08_0135) (as modified) and any other legislation that is applicable under the *Environmental Planning and Assessment Act 1979*.

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

- *Crown Land Management Act 2016;*
- *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 PREDICTED SUBSIDENCE IMPACTS AND ENVIRONMENTAL CONSEQUENCES

4.1 LONGWALLS 409 TO 414 EXTRACTION SCHEDULE

LW409-414 and the area of land within the Study Area are shown on **Figure 3**. Longwall extraction will occur from the north to the south for each panel. The longwall layout includes approximately 260 metre (m) panel widths (void) with 35 m width pillars (solid). The provisional extraction schedule for LW409-414 is provided in **Table 2**.

Table 2: Provisional Extraction Schedule

Longwall	Estimated Start Date	Estimated Duration (months)	Estimated Completion Date
LW409	September 2026	3	November 2026
LW410	December 2026	3	March 2027
LW411	April 2027	3	July 2027
LW412	August 2027	4	December 2027
LW413	January 2028	4	May 2028
LW414	June 2028	4	September 2028

Note: In June 2026, the extraction timing was administratively updated to ensure consistency with the approved June versions of the LW409-414 Water Management Plan and LW409-414 Subsidence Monitoring Program. This update does not otherwise amend the approved April version of this Plan.

4.2 REVISED SUBSIDENCE AND IMPACT PREDICTIONS

Revised subsidence predictions of the potential subsidence effects, subsidence impacts and environmental consequences of the proposed second workings, have been prepared by MSEC (2024) incorporating any relevant information obtained since approval (e.g. additional data from underground mining in UG1 and LW401-408 to date), in accordance with Condition 77(e), Schedule 3 of Project Approval (05_0117).

The LW409-414 LMP has incorporated the revised subsidence predictions and impacts from the *Moolarben Project Stage 1 – Longwalls 409 to 414 – Subsidence Predictions and Impact Assessments for the Natural and Built Features in Support of the Extraction Plan* (MSEC, 2024) which are summarised in **Sections 4.4** to **4.5**.

Predicted subsidence impacts to the Drip and Corner Gorge from the extraction of LW409-414 are described in the Monitoring Program (**Appendix H**).

4.3 ENVIRONMENTAL RISK ASSESSMENT

An Environmental Risk Assessment (ERA) was conducted for four of the key component plans of the UG4 LW409-414 Extraction Plan (Water Management Plan, Biodiversity Management Plan, Heritage Management Plan and Land Management Plan) to provide appropriate consideration to risk assessment and risk management in accordance with the *Extraction Plan Guideline* (DPE, 2022).

The ERA workshop for LW409-414 was held on 2 May 2024, facilitated by independent specialist, AXYS Consulting Pty Ltd. The suitably qualified and experienced experts endorsed by the Secretary of the DPHI for the preparation of the UG4 LW409-414 Extraction Plan and relevant MCO personnel participated in the ERA.

The ERA indicated that risks relevant to land associated with or in the vicinity of the LW409-414 Study Area including land in general and cliffs were in the "Low" and "Medium" category, and it was expected that the risks could be managed with implementation of the appropriate mitigation, management and/or control measures.

4.4 LAND IN GENERAL

Land in general refers to the general landscape other than cliffs within the Study Area. 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 which are addressed elsewhere in the Extraction Plan. Unsealed vehicular tracks and fire trails are located throughout the Study Area and above LW409-414.

The depths of cover over the underground mining areas vary from 120 m to 215 m. At the shallow depths of cover above LW409-414, surface cracking is expected to be typically in the order of 150 mm to 200 mm wide, however in some instances could be up to 500 mm wide where the depths of cover are the shallowest. Where the depths of cover are greater, the surface crack widths are expected to be typically in the order of 100 mm to 150 mm wide. 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.

The surface cracking and deformation within the Study Area 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 drainage lines and steeper slopes) (MSEC, 2024).

4.5 CLIFFS

A detailed assessment to identify all possible cliffs and minor cliffs[2] within and in the vicinity of the LW409-414 Study Area was completed by MSEC (2024), using 1 m surface level contour generated from a Light Detection and Ranging (LiDAR) survey and from site investigations.

The assessment of cliffs and minor cliffs included identification of cliff features within the Goulburn River National Park (GRNP) and Goulburn River State Conservation Area (GRSCA) within the vicinity of the longwalls. Within the GRNP, the nearest minor cliff is located 313 m from the commencing end of LW414. There are no other cliffs or minor cliffs within the GRNP within 400 m of the longwalls. Within the GRSCA, the nearest cliff is 330 m from LW412 and the nearest minor cliff is 300 m from LW412 (MSEC, 2024).

A summary of cliffs within the LW409-414 Study Area is provided in **Table 3**. The locations of these cliffs, as well as cliffs and minor cliffs identified within the GRNP and GRSCA are shown in **Figure 4.**

[2] The definitions of cliffs and minor cliffs provided in the NSW DP&E *Standard and Model Conditions for Underground Mining* (DP&E, 2012) are:

"Cliff 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)

Minor Cliff A continuous rock face, including overhangs, having a minimum length of 20 metres, heights between 5 metres and 10 metres and a minimum slope of 2 to 1 (>63.4º); or a rock face having a maximum length of 20 metres and a minimum height of 10 metres"

Table 3: Classification of Cliffs within the Study Area

Cliff Line Area ID	Maximum Height (m)	Maximum Length (m)	Classification
CL1	10	60	Minor Cliff
CL2	8	30	Minor Cliff
CL3	15	500	Cliff
CL4	10	30	Minor Cliff

Source: After MSEC (2024)

Based on the summary in **Table 3**, only CL3 is classified as a cliff.

CL3 is located adjacent to LW413, which has been shortened to reduce the predicted impacts at CL3. A photograph of CL3 is provided in **Plate 1**. A detailed plan of CL3 prepared by MSEC is provided in **Figure 6**.

Plate 1: Cliff Line CL3

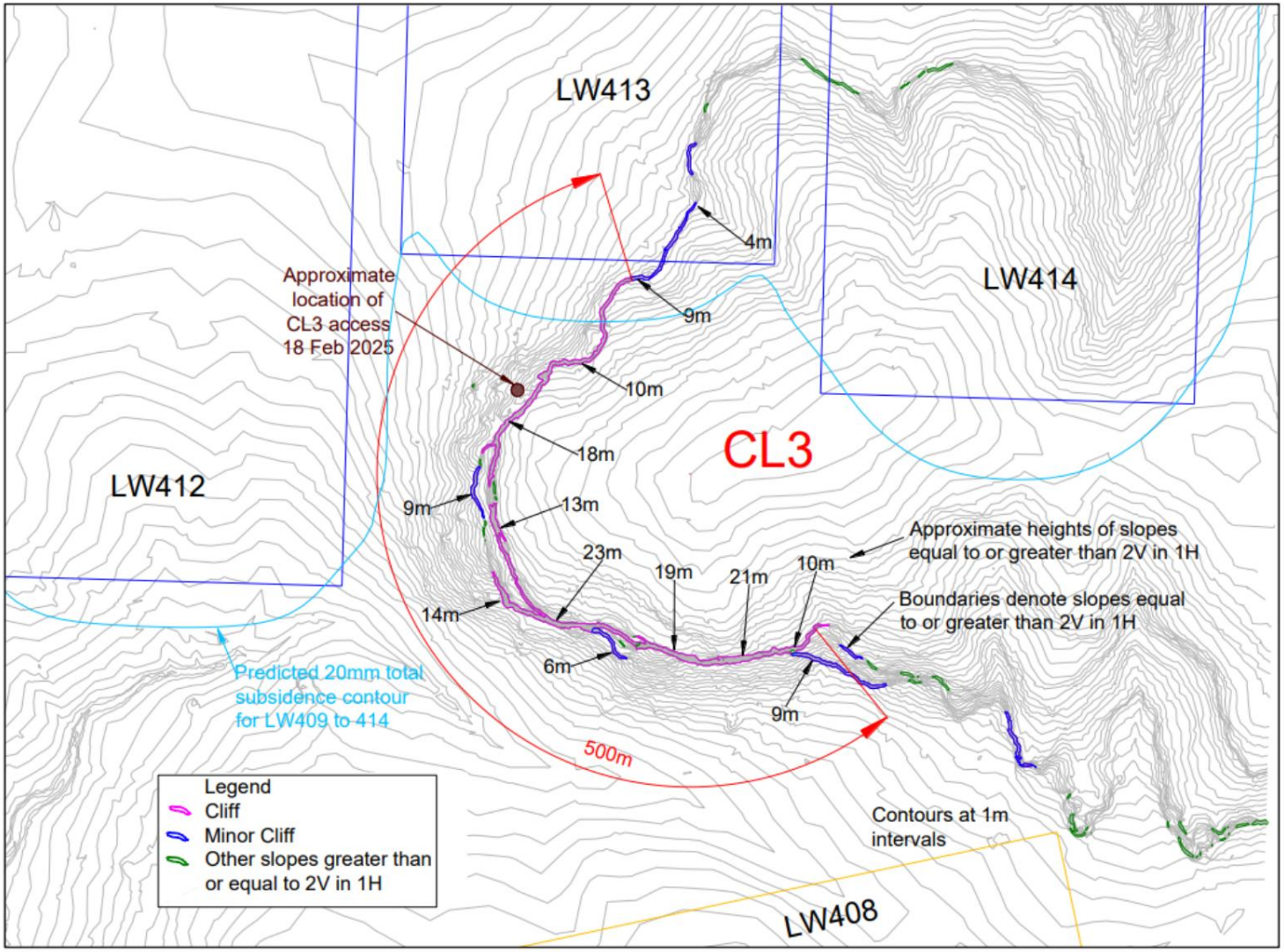
4.5.1 Predicted Subsidence Impacts for Cliffs

Further information on predicted subsidence impacts for cliffs is provided in the *Moolarben Project Stage 1 – Longwalls 409 to 414 – Subsidence Predictions and Impact Assessments for the Natural and Built Features in Support of the Extraction Plan* (MSEC, 2024).

Cliff Line 3

CL3 is located adjacent to the finishing end of LW413 and is over 165 m to the north of LW408 (**Figure 4**) and the length of LW413 has been reduced by 125 m for the Extraction Layout compared to the Approved Layout to reduce the predicted impacts at CL3. Assessment of the risk of impact to CL3 has taken into consideration the possibility of impact to the minor cliff adjoining the northern end of CL3.

Figure 6: Detailed Plan of Cliff Line CL3



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The maximum predicted values of total conventional subsidence, tilt and curvature for CL3 due to the extraction of LW409-414 for the Extraction Plan Layout is provided in **Table 4**. The maximum predicted conventional subsidence parameters based on the Extraction Plan Layout are less than those for the Approved Layout (MSEC, 2024).

Table 4: Comparison of Maximum Predicted Conventional Subsidence Parameters for CL3 based on the Approved Layout and the Extraction Plan Layout

Layout	Subsidence[1] (mm)	Tilt[2] (mm/m)	Hogging Curvature[3] (km^{-1})	Sagging Curvature[3] (km^{-1})
Approved Layout	1700	30	0.85	0.85
Extraction Plan Layout	90	2.5	0.09	0.01

Source: MSEC (2024).

mm/m = millimetres per metre, km^{-1} = 1/kilometres.

1 Subsidence refers to vertical displacements of the ground.

2 Tilt is the change in the slope of the ground as a result of differential subsidence and is calculated as the change in subsidence between two points divided by the distance between those two points.

3 Curvature is the second derivative of subsidence, the rate of change of tilt, and is calculated as the change in tilt between two adjacent sections of the tilt profile divided by the average length of those sections.

The risk of impact to CL3 is significantly reduced by reducing the length of LW413 (MSEC, 2024).

Cliffs and Minor Cliffs within the GRNP and GRSCA

The nearest minor cliff within the GRNP is located 313 m from the commencing end of LW414. There are no other cliffs or minor cliffs within the GRNP within 400 m of the longwalls. At 313 m or greater from the nearest longwall, the cliffs and minor cliffs are located 2.5 times the depth cover or greater from the longwalls. At distances of 313 m or 2.5 times the depth of cover between the longwalls and the minor cliffs, the maximum expected incremental far-field horizontal movements based on MCO monitoring data is 40 mm (MSEC, 2024).

The nearest minor cliff within the GRSCA is located 300 m from the commencing end of LW412. The nearest cliff within the GRSCA is located 330 m from the commencing end of LW412. At 330 m or greater from the nearest longwall, the cliffs and minor cliffs are located 2.4 times the depth cover or greater from the longwalls. At distances of 330 m or 2.4 times the depth of cover between the longwalls and the minor cliffs, the maximum expected incremental far-field horizontal movements based on MCO monitoring data is 45 mm (MSEC, 2024).

There is extensive experience of mining adjacent to (i.e. not directly beneath) cliffs in the NSW Coalfields which indicates that the likelihood of impacts on cliffs or minor cliffs outside of the Study Area is very low. There have been no large cliff instabilities where the cliffs have been wholly located outside the extents of mining. It is unlikely, therefore, that the cliffs and minor cliffs within the GRNP and GRSCA would be adversely impacted by far-field horizontal movements (MSEC, 2024).

5.0 PERFORMANCE MEASURES AND PERFORMANCE INDICATORS

This LW409-414 LMP has been developed to manage the potential environmental consequences of the secondary extraction of LW409-414 on land in general and cliffs in accordance with Condition 77(j), Schedule 3 of Project Approval (05_0117).

Subsidence impact performance measures relevant to the Drip and Corner Gorge are described in the Monitoring Program (**Appendix H**), which has been prepared in accordance with Condition 73, Schedule 3 of Project Approval (05_0117). The proposed monitoring network and TARPs to demonstrate there is no exceedance of the subsidence impact performance measures for the Drip and Corner Gorge are provided in the Monitoring Program (**Appendix H**).

In accordance with Condition 73, Schedule 3 of Project Approval (05_0117), MCO must ensure that there is no exceedance of the subsidence impact performance measures listed in Table 14, Schedule 3 of Project Approval (05_0117), relevant to land in the LW409-414 Study Area as listed in **Table 5.**

Table 5: Land Subsidence Impact Performance Measures

Feature	Subsidence Impact Performance Measure
Cliff Line 3	Minimise subsidence damage

Source: Table 14 of Condition 73, Schedule 3 of Project Approval (05_0117).

As described in **Section 4.5**, the mine plan has been modified by shortening LW413 to avoid mining directly beneath CL3. There is no definition for the performance measure of "minimise subsidence damage". MSEC (2024) consider it reasonable to assume that minimal damage to CL3 would constitute a mine layout that reduces the risk of impact to minimal or minor impacts. The Project Approval (05_0117) defines minor as "Not very large, important or serious". Impact to a cliff such as cracking, minor rock fall or minor spalling that occur at isolated locations are considered minor impacts (MSEC, 2024).

It is therefore considered that the reduced length of LW413 would be sufficient to minimise subsidence damage to CL3 (MSEC, 2024).

Project Approval (05_0117) does not include any specific performance measures for the GRNP and GRSCA. However, a performance indicator has been adopted for cliffs and minor cliffs in the GRNP and GRSCA within 400 m of LW409-414, as developed in consultation with NSW National Parks and Wildlife Service (NPWS) for LW401-408:

- Negligible impact due to longwall mining for cliffs and minor cliffs in the GRNP and GRSCA.

As described in **Section 4.5**, MSEC (2024) have concluded it is unlikely that the cliffs and minor cliffs within the GRNP and GRSCA would be adversely impacted by far-field horizontal movements.

Section 6.0 describes the monitoring that will be conducted to assess LW409-414 against the relevant subsidence impact performance measures and indicators, and management measures are described in **Section 7.0**.

6.0 MONITORING

A monitoring program will be implemented to monitor the impacts of the secondary extraction of LW409-414 on land features including the land in general, cliffs within the LW409-414 Study Area and cliffs and minor cliffs in the GRNP and GRSCA. Key components of the monitoring program are summarised in **Table 6**.

Subsidence monitoring for the Drip and Corner Gorge is detailed in the Monitoring Program (**Appendix H**).

Table 6: UG4 LW409-414 Land Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Pre-mining			
Visual inspection of cliff CL3	Observations and description (e.g. baseline photography, existing rockfalls, cliff instabilities, surface cracking).	Prior to secondary extraction of LW409.	Underground Technical Services Manager
Visual inspection of cliffs and minor cliffs in GRNP and GRSCA within 400 m of LW409-414 and the 'natural rock arch feature' along the Drip walking track	Observations and description (e.g. baseline photography, existing rockfalls, cliff instabilities, surface cracking).	Prior to secondary extraction within 400 m of cliffs and minor cliffs in GRNP and GRSCA and the 'natural rock arch feature' along the Drip walking track.	Underground Technical Services Manager
UG4 subsidence monitoring, as described in the UG4 Longwalls 409 to 414 Subsidence Monitoring Program (LW409-414 SMP), including GNSS units at CL3	As described in the LW409-414 SMP (to determine baseline movements).	Prior to the secondary extraction of LW409.	Underground Technical Services Manager
During & After Mining			
UG4 subsidence monitoring, as described in the LW409-414 SMP, including GNSS units	As described in the LW409-414 SMP (at CL3).	During mining of LW409-414.	Underground Technical Services Manager
Visual inspection of cliff CL3	Observations and description (e.g. comparison to baseline photography).	At the completion of LW413.	Underground Technical Services Manager
Visual inspection of cliffs and minor cliffs in GRNP and GRSCA within 400 m of LW409-414 and the 'natural rock arch feature' along the Drip walking track	Observations and description (e.g. comparison to baseline photography).	At the completion of secondary extraction within 400 m of cliffs and minor cliffs in GRNP and GRSCA and proximal to the 'natural rock arch feature' along the Drip walking track.	Environment and Community Manager

Table 6 (Continued): UG4 LW409-414 Land Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Access tracks and surface features within the Study Area	Evidence of subsidence impacts observations (e.g. photography, nature and extent of surface cracking, rockfalls, displacement or dislodgement of boulders or slabs, or fracturing).	Opportunistic visual observations during mining.	Underground Technical Services Manager

6.1 SUBSIDENCE PARAMETERS

Subsidence parameters (i.e. vertical subsidence, tilt, tensile strain, compressive strain) will be measured in accordance with the LW409-414 SMP. In summary, ground surveys will be conducted to measure subsidence movements in three dimensions using a total station survey instrument. Subsidence movements will be measured along subsidence lines that have been positioned across the general landscape or feature. GNSS monitoring stations have also been installed and additional GNSS monitoring sites will be progressively established at locations above and adjacent to the LW409-414 Study Area over the life of LW409-414 in accordance with the LW409-414 SMP.

6.2 SUBSIDENCE IMPACTS

Visual inspections of CL3 will be conducted prior to the secondary extraction of LW409 to photographically record the baseline condition. The outcomes of the post-mining inspection (i.e. at the completion of LW413) will be compared to the pre-mining condition to evaluate the relevant subsidence impact performance indicators for CL3.

Visual inspection of cliffs and minor cliffs in the GRNP and GRSCA and the 'natural rock arch feature' along the Drip walking track will be conducted prior to the secondary extraction within 400 m of cliffs and minor cliffs in GRNP and GRSCA to photographically record the baseline condition. The outcomes of the post-mining inspection (i.e. at the completion of secondary extraction within 400 m of cliffs and minor cliffs in GRNP and GRSCA and the 'natural rock arch feature' along the Drip walking track) will be compared to the pre-mining condition to evaluate the relevant subsidence impact performance indicators for minor cliffs in the GRNP and GRSCA

Visual inspections of land in general including MCO's vehicular tracks and surrounds will be conducted opportunistically during mining. Where relevant, if subsidence impacts are observed during an inspection on other land features within the LW409-414 Study Area, any observed rockfalls, displacement of or dislodgement of boulders or slabs, or fracturing will be recorded.

MCO will compare the results of the subsidence impact monitoring against the land performance measures and indicators (**Section 5.0**). 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 8.0**.

If subsidence impact(s) which have the potential to impact on the land performance measures and indicators (**Section 5.0**) are observed during an inspection, the following details will be recorded and the impacted area 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.

7.0 MANAGEMENT MEASURES

A number of potential management measures are available to mitigate/remediate subsidence impacts to land features resulting from the extraction of LW409-414. 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.
- Potential impacts of the remediation technique, including site accessibility.

The implementation of management measures will be considered with regard to the specific circumstances of the subsidence impact (e.g. the location, nature and extent of the impact) and the assessment of environmental consequences. The implementation of management measures will be related to the scale of impact and the ability to, and value in, undertaking mitigation measures on a case by case basis. Potential management measures that will be considered to mitigate/remediate environmental consequences, if safe to do so and would not result in greater damage than the subsidence impact itself, are provided in **Table 7**.

Table 7: Potential Management Measures

Potential Management Measures	
Measure	**Description**
Stabilisation techniques	• Scaling/dislodgement/removal of remaining loose rock.
Erosion and sediment control techniques	• Implementation of erosion and sediment control measures, such as: – Installation of sediment fences downslope of erosion areas. – Stabilisation of erosion areas using rock or other appropriate materials.
Site access control, signage, stabilisation techniques within the Study Area	• Measures to address safety hazards will be implemented in accordance with the UG4 Longwalls 409 to 414 Public Safety Management Plan (LW409-414 PSMP), such as: – Signage to warn persons accessing the area of safety hazards. – Construction or placement of barriers to restrict access to unsafe areas. – Vehicular access points (other than Saddlers Creek Road) will be restricted through locked gates and boundary fencing.
Remediation of surface tension crack	• Permanent filling of the surface tension cracks. Methods of in-filling may include manual application or use of small machinery (e.g. bob cat) where practicable (e.g. where use of this equipment would not result in greater impact than the cracking itself).

Where new impacts (rockfalls, cliff instabilities, surface cracking) on cliff and minor cliff features in the GRNP and GRSCA are observed within 400 m of longwalls or the 'natural rock arch feature' along the Drip walking track (whether due to longwall extraction or not), notification will be provided to the NPWS Area Manager and Conservation Programs, Heritage and Regulation (CPHR) as soon as practicable after becoming aware. MCO will complete a visual assessment, review subsidence data associated with the LW409-414 Extraction Plan and provide a copy to the NPWS Area Manager and CPHR within 14 days unless otherwise agreed with the NPWS.

In the event the subsidence impacts are deemed to present a safety hazard (i.e. regardless of the nature or extent of the subsidence impact) actions will be implemented in accordance with the LW409-414 PSMP (**Appendix F**).

The implementation of any stabilisation techniques or measures to improve the aesthetic value of the feature within the GRNP or GRSCA, other than those listed in **Table 7**, will be undertaken in consultation with the NPWS and/or Crown Lands (where required). Appropriate erosion and sediment control techniques will be implemented as required. Follow-up inspections will be conducted to assess the effectiveness of implemented management measures and the requirement for any additional management measures. Management measures will be reported in the Annual Review (**Section 9.1**).

8.0 CONTINGENCY PLAN

In the event a subsidence impact performance measure relevant to land (**Table 5**) 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 Services Manager and/or the Environment and Community Manager within 24 hours.
- The observation will be recorded consistent with the monitoring program described in **Section 6.0**.
- Any exceedance of a subsidence impact performance measure relevant to land will be reported to the DPHI as soon as practicable after MCO becomes aware of the exceedance.
- MCO will assess public safety and where appropriate implement safety measures in accordance with the LW409-414 PSMP.
- MCO will assess the impacts on the aesthetic values of the land feature.
- MCO will conduct an investigation to evaluate the potential contributing factors. The investigation will:
  - include the re-survey of relevant subsidence monitoring lines;
  - compare and critically analyse measured versus predicted subsidence parameters;
  - review measured subsidence parameters against the observed impact; and
  - review the LW409-414 SMP and update the program where appropriate.
- MCO will identify an appropriate course of action with respect to the identified impact(s), in consultation with specialists and relevant agencies, as necessary. For example:
  - proposed contingency measures;
  - a program to review the effectiveness of the contingency measures; and
  - consideration of adaptive management.

The proposed course of action will consider the nature and extent/scale of all recorded impacts. It may, for example, be more appropriate to remediate previously impacted areas as opposed to the specific impact that initiated the implementation of the Contingency Plan. In the event that MCO propose to remediate previously impacted areas as opposed to the specific impact that initiated the implementation of the Contingency Plan, MCO will:

- Submit the proposed course of action to the DPHI for approval.
- Implement the approved course of action to the satisfaction of the DPHI.

Contingency measures will be developed in consideration of the specific circumstances of the impact (e.g. location, nature and extent) and the assessment of environmental consequences. Potential contingency measures may include management measures similar to those described in **Table 7**.

8.1 TRIGGER ACTION RESPONSE PLAN

The framework for the various components of this LW409-414 LMP are summarised in the TARPs shown in **Attachment 1.** The TARPs illustrate how the various predicted subsidence impacts, monitoring components, performance indicators, and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions. The TARP system provides a simple and transparent snapshot of the monitoring of environmental performance and the implementation of management and/or contingency measures.

Management measures and TARPs for the Drip and Corner Gorge are provided in the Monitoring Program (**Appendix H**).

9.0 REVIEW AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

9.1 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 LW409-414 LMP) prior to 31 March for the preceding calendar year, or as otherwise agreed by the Secretary of the DPHI.

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 Environmental Assessment;
- 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 Yancoal's website. As described in **Section 2.0**, this LW409-414 LMP 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.

9.2 AUDITS

In accordance with Condition 9, Schedule 5 of Project Approval (05_0117), the most recent independent environmental audit of the Moolarben Coal Complex was conducted in July 2024, and will continue to be conducted every three years. A copy of the independent environmental audit will be provided to the Secretary of the DPHI and made available on the Yancoal's 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 DPHI. 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.

As described in **Section 2.0**, this LW409-414 LMP will be reviewed within three months of the submission of an independent environmental audit, and, if necessary, revised to ensure the plan is updated on a regular basis and to incorporate any recommended measures to improve environmental performance.

9.3 FUTURE EXTRACTION PLANS

In accordance with Condition 77(p), Schedule 3 of Project Approval (05_0117), MCO will collect baseline data for future Extraction Plans (e.g. for the next underground mining domain). 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 LW409-414 LMP, will inform the appropriate type and frequency of monitoring of the assets relevant to any future Extraction Plan at the Moolarben Coal Complex.

10.0 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 Environmental Management Strategy.

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 DPHI and any other relevant agencies of any incident associated with LW409-414 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 mining of LW409-414, MCO will notify the Secretary and any other relevant agencies as soon as practicable after becoming aware of the incident. Incidents relating to the GRNP or GRSCA will include notification of the NPWS Area Manager and CPHR. Within seven days of the date of the incident, MCO will provide the Secretary of DPHI 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.

11.0 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 Yancoal's website.

12.0 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 Environment 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 10.0**, MCO will notify the Secretary of the DPHI, and any other relevant agencies, of any incident associated with LW409-414 immediately after MCO becomes aware of the incident. Within seven days of the date of the incident, MCO will provide the Secretary of the DPHI, 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) will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the Yancoal's website.

As described in **Section 9.2**, the most recent independent environmental audit was conducted in July 2024, and will be conducted every three years thereafter. A copy of the independent environmental audit will be provided to the Secretary of the DPHI and made available on the Yancoal's website.

13.0 REFERENCES

Department of Planning and Environment (2022) *Extraction Plan Guideline.*

Mine Subsidence Engineering Consultants (2024) *Moolarben Project Stage 1 – Longwalls 409 to 414 Subsidence Predictions and Impact Assessments for the Natural and Built Features in Support of the Extraction Plan.*

ATTACHMENT 1

UG4 LONGWALLS 409 TO 414 LAND MANAGEMENT PLAN
TRIGGER ACTION RESPONSE PLAN

UG4 Longwalls 409 to 414 Land in General and Cliffs TARP

Condition	Normal		Level 1	Level 2
	Baseline Conditions	**Predicted Impacts**	**Implement Management Measures**	**Restoration/Contingency Phase**
Trigger	Subsidence damage to CL3 minimised consistent with Project Approval (05_0117). Negligible impact to cliffs and minor cliffs in the GRNP and GRSCA due to longwall mining.	Subsidence parameters and environmental consequences as predicted for cliffs (**Section 4.5**) and land in general (**Section 4.4**) within and in the vicinity of the Study Area.	Monitoring identifies impacts that are greater than predicted, but the performance measure or performance indicator has not been exceeded and is not likely to be exceeded. New impacts (rockfalls, cliff instabilities, surface cracking) on cliffs and minor cliffs in the GRNP and GRSCA within 400 m of LW409-414 (whether due to longwall extraction or not).	Monitoring identifies impacts that are greater than predicted, and the performance measure relevant to CL3 or performance indicator relevant to cliffs/minor cliffs in the GRNP and GRSCA has been exceeded, or is likely to be exceeded (**Section 5.0**).
Action	Establish baseline data consistent with **Section 6.0**, including: • Visual inspections of CL3, cliffs/minor cliffs in the GRNP and GRSCA (baseline photography), including observations of existing rockfalls / instabilities / surface cracking. • Pre-extraction subsidence survey as per the LW409-414 SMP.	Conduct monitoring, consistent with **Section 6.0** including: • Subsidence monitoring as per the LW409-414 SMP. • Visual inspection of CL3, cliffs/minor cliffs in GRNP and GRSCA (comparison to baseline photography).	Where new impacts (rockfalls, cliff instabilities, surface cracking) on cliffs and minor cliffs in the GRNP or GRSCA are identified within 400 m of LW409-414, NPWS Area Manager and CPHR notified and visual assessment undertaken as described in **Section 7.0**. Management measures implemented as described in **Section 7.0** (with regard to the specific circumstances of the subsidence impact [e.g. the nature and extent of the impact]), in consultation with relevant land holders (Crown Lands or NPWS). Follow-up inspections will be conducted to assess the effectiveness of the management measures implemented and the requirement for any additional management measures.	Implement Contingency Plan as described in **Section 8.0,** including. management measures as described in **Section 7.0** if required. Incidents will be reported and investigated in accordance with **Section 10.0**.
Frequency	• Baseline visual inspection of CL3 prior to the secondary extraction of LW409. • Baseline visual inspection of cliffs/minor cliffs in the GRNP and GRSCA prior to the secondary extraction within 400 m of cliffs and minor cliffs in GRNP and GRSCA. • Pre-extraction subsidence survey as per the LW409-414 SMP. – Prior to the secondary extraction of LW409.	• Subsidence monitoring (i.e. GNSS) as per the LW409-414 SMP. • Visual inspection of CL3 at the completion of LW413 (comparison to baseline photography). • Visual inspection of cliffs/minor cliffs in GRNP and GRSCA at the completion of secondary extraction within 400 m of the cliffs and minor cliffs (comparison to baseline photography).	To be implemented as required (i.e. if monitoring identifies impacts that are greater than predicted, but the performance measure or performance indicator has not been exceeded and is not likely to be exceeded).	To be implemented following identification of an exceedance of the performance measure or performance indicator, or if the performance measure or performance indicator is likely to be exceeded (**Section 5.0**).
Position of Decision Making	Environment and Community Manager and Underground Technical Services Manager.	Environment and Community Manager and Underground Technical Services Manager.	Environment and Community Manager and Underground Technical Services Manager.	Environment and Community Manager and Underground Technical Services Manager.