



**UG4 LONGWALLS 409 TO 414
BUILT FEATURES
MANAGEMENT PLAN
SADDLERS CREEK ROAD**

Version	Issue Date (Month/YYYY)	Revision Detail (Include the main areas reviewed, trigger / why the change)	Author (Name/s)	Review Team (Name/s)
1	October 2024	Original BFMP for Saddlers Creek Road for the UG4 Longwalls 409-414 Extraction Plan	MCO	MCO
2	January 2025	Updated to Address Agency Consultation	MCO	MCO
3	April 2026	Updated to Address Agency Consultation	MCO	MCO

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- Attachment 1 Moolarben Coal Operations – Longwalls 409 to 414 Subsidence Predictions and Impact Assessment for Saddlers Creek Road
- Attachment 2 UG4 Longwalls 409 to 414 Built Features Management Plan – Saddlers Creek Road Trigger Action Response 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. 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 LW414 (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 Built Features Management Plan – Saddlers Creek Road (LW409-414 BFMP-SCR) has been prepared to satisfy the requirements of Condition 77(g), Schedule 3 of Project Approval (05_0117) for the management of potential impacts to a section of the existing Saddlers Creek Road due to secondary extraction of LW409-414.

This LW409-414 BFMP-SCR forms a part of the Extraction Plan developed for LW409-414 of the approved UG4. This LW409-414 BFMP-SCR has been prepared by MCO, with input from Mine Subsidence Engineering Consultants (MSEC), to satisfy the requirements of Project Approval (05_0117) (as modified) and the *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).

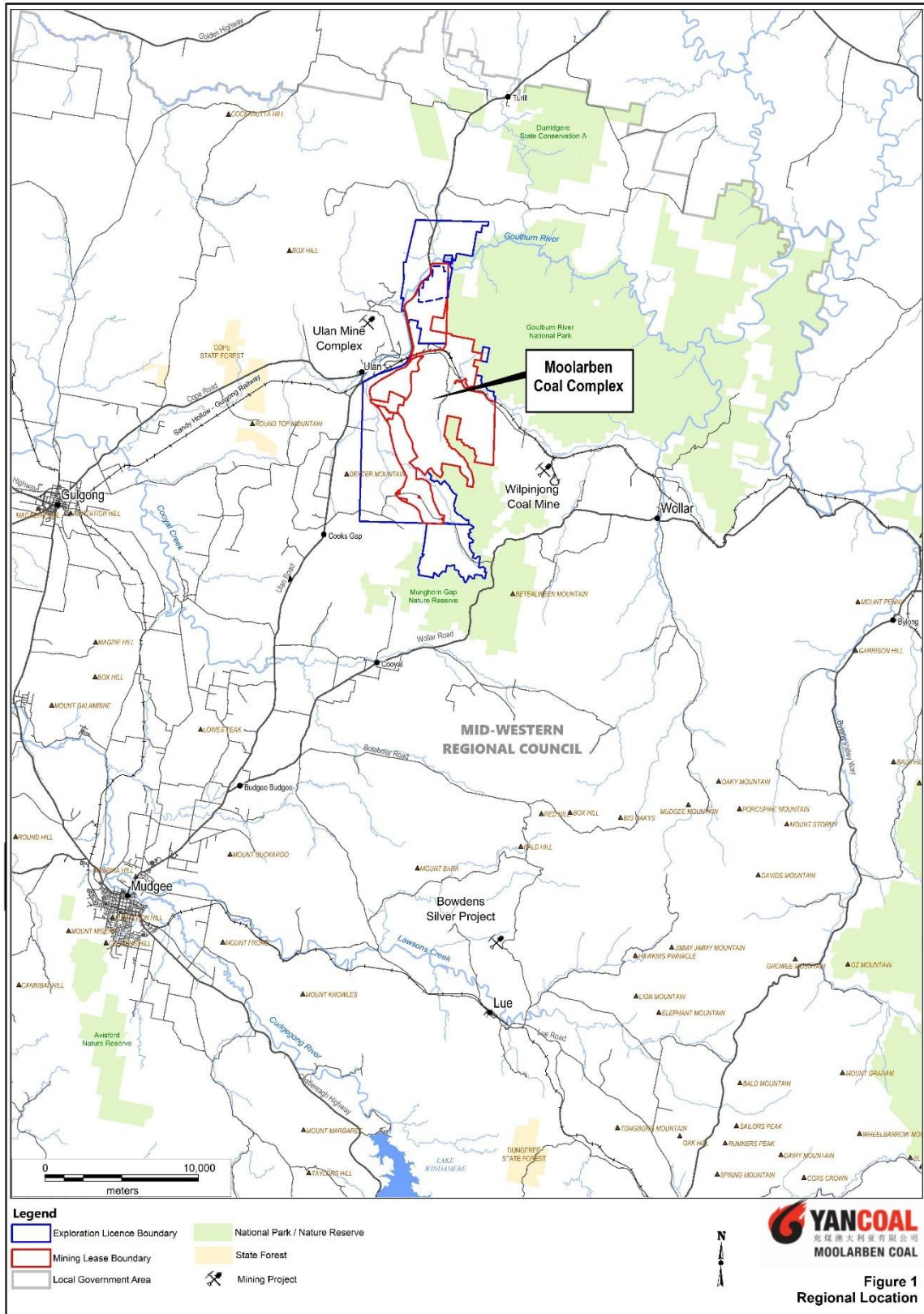
Purpose: This LW409-414 BFMP-SCR outlines the management of potential subsidence impacts of the proposed secondary workings described in the Extraction Plan on a section of the existing Saddlers Creek Road.

Scope: This LW409-414 BFMP-SCR covers the section of the Saddlers Creek Road within and proximal to the Study Area¹ and immediate surrounds, which relates to the extent of subsidence effects resulting from the secondary extraction of LW409-414 (**Figure 4**).

¹ LW409-414 and the area of land within the furthest extent of the 26.5 degree (°) angle of draw and 20 millimetres (mm) predicted subsidence contour. Sections of Saddlers Creek Road not located within the Study Area may be subject to far-field movements (**Section 4.3**).

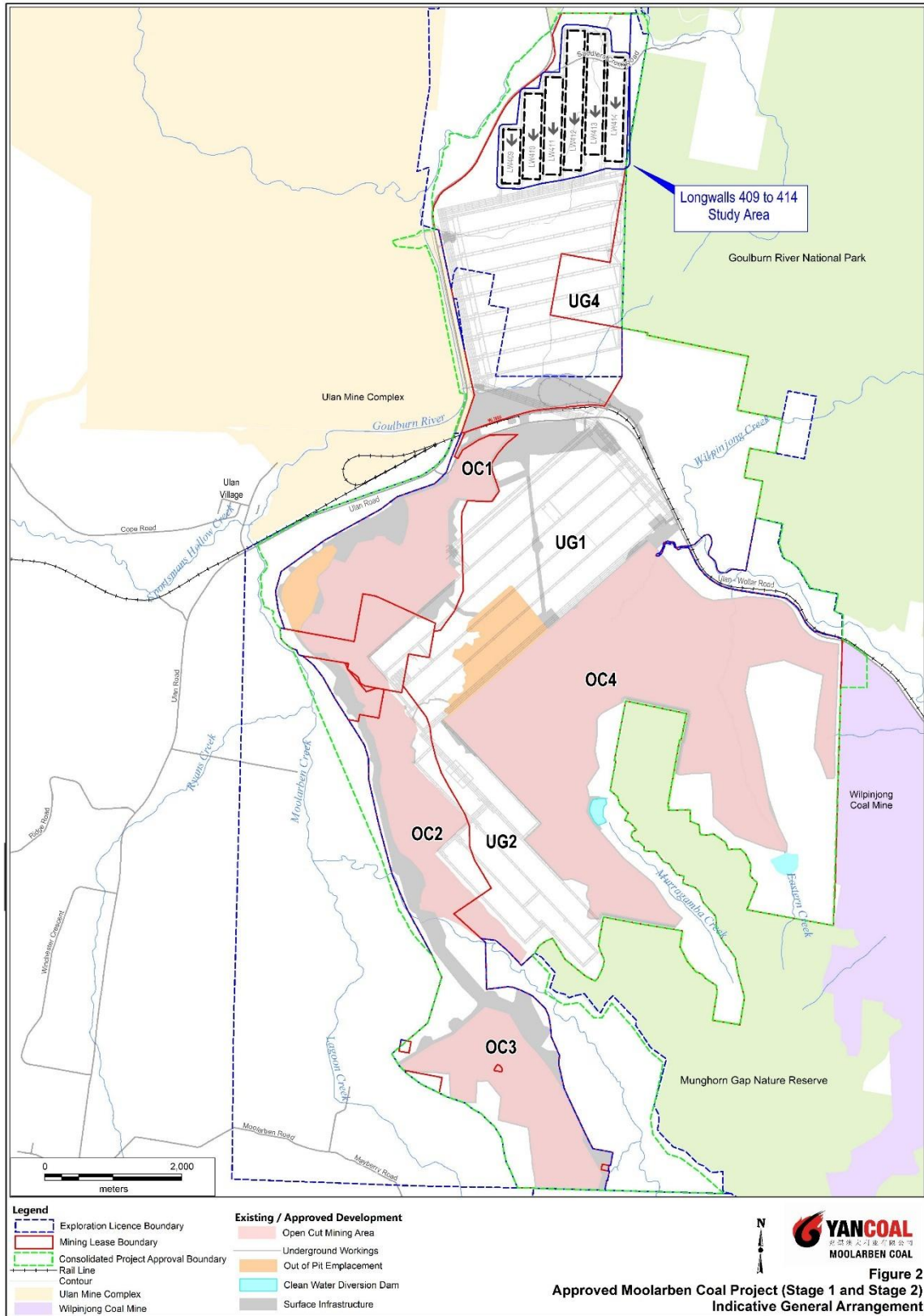
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Figure 1: Regional Location



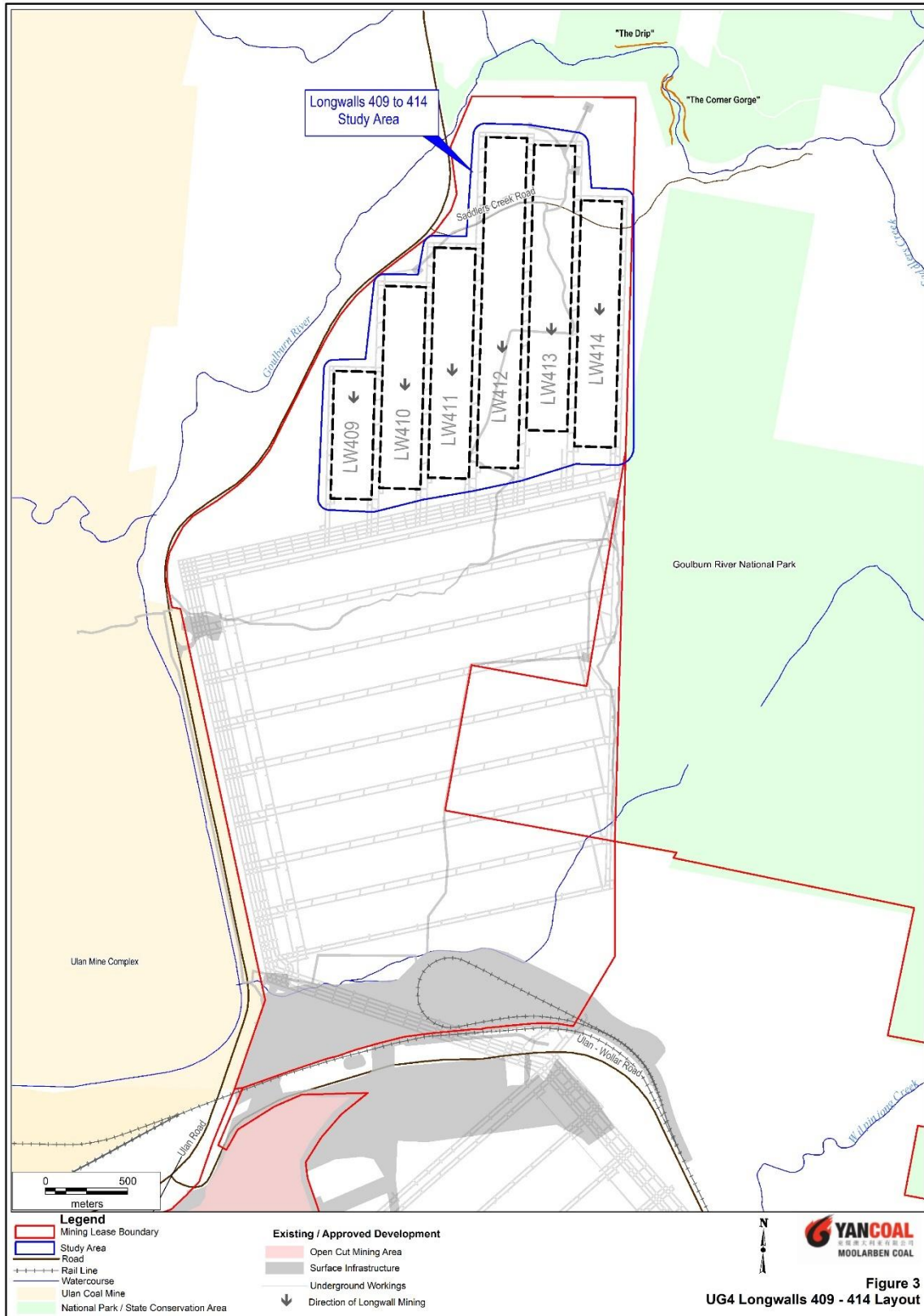
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Figure 2: Moolarben Coal Complex Layout



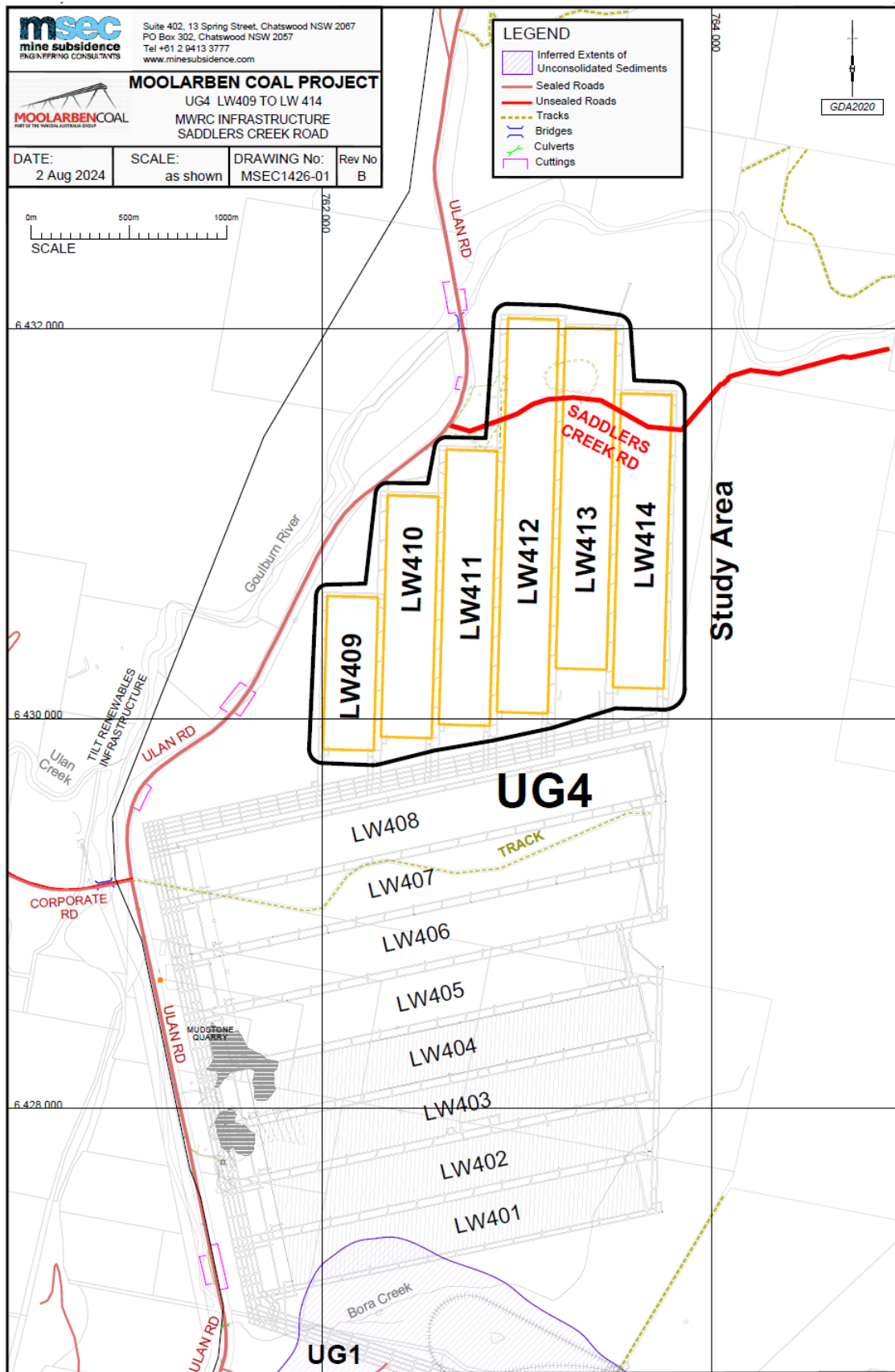
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Figure 3: UG4 Longwalls 409 to 414 Layout



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Figure 4: Saddlers Creek Road



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Saddlers Creek Road is an unsealed dirt road located on Crown Land (that is managed by Mid-Western Regional Council [MWRC]) that is undermined by the northern ends of LW412-414 (**Figure 4**). Impacts, predictions and management of the subsidence impacts on other MWRC assets are discussed in a separate document (Appendix E1 of the Extraction Plan)

1.2 STRUCTURE OF THE LONGWALLS 409 TO 414 BUILT FEATURES MANAGEMENT PLAN – SADDLERS CREEK ROAD

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

- Section 2:** Describes the review and update of the LW409-414 BFMP-SCR.
- Section 3:** Outlines the statutory requirements applicable to the LW409-414 BFMP-SCR.
- Section 4:** Provides baseline data, extraction schedule, revised assessment of the potential subsidence impacts and environmental consequences for LW409-414, as well as the outcomes of the risk assessment.
- Section 5:** Details the performance measures relevant to Saddlers Creek Road.
- Section 6:** Describes the monitoring program.
- Section 7:** Describes the management measures that will be implemented.
- Section 8:** Details the performance indicators that will be used to assess against the performance measures.
- Section 9:** Provides a contingency plan to manage any unpredicted impacts and their consequences.
- Section 10:** Describes the Trigger Action Response Plan (TARP) management tool.
- Section 11:** Describes the roles and responsibilities for MCO personnel and key contacts.
- Section 12:** Describes the Annual Review, audits, regular reporting and improvement of environmental performance and the program to collect sufficient baseline data for future Extraction Plans.
- Section 13:** Outlines the management and reporting of incidents.
- Section 14:** Outlines the management and reporting of complaints.
- Section 15:** Outlines the management and reporting of non-compliances with statutory requirements.
- Section 16:** Lists the references cited in this LW409-414 BFMP-SCR.

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2.0 LONGWALLS 409 TO 414 BUILT FEATURES MANAGEMENT PLAN – SADDLERS CREEK ROAD REVIEW AND UPDATE

In accordance with Condition 5, Schedule 5 of Project Approval (05_0117), this LW409-414 BFMP-SCR 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 (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 5 of Project Approval (05_0117), MCO will make the approved LW409-414 BFMP-SCR publicly available on the Yancoal’s 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);
- 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 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 BFMP-SCR are described below.

3.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979 PROJECT APPROVAL

Condition 77(g), Schedule 3 of Project Approval (05_0117), requires the preparation of a Built Features Management Plan as a component of the Extraction Plan. In addition, Conditions 75, 77(n), 77(p) and 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 BFMP-SCR.

Table 1 presents these requirements and indicates where they are addressed within this LW409-414 BFMP-SCR.

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Table 1: Management Plan Requirements

Project Approval (05_0117) Condition	LW409-414 BFMP-SCR Section
Condition 75, Schedule 3	
<p>Notes:</p> <p>...</p> <ul style="list-style-type: none"> The Proponent will be required to define more detailed performance indicators for each of these performance measures in Built Features Management Plans or Public Safety Management Plan (see condition 74 below). Measurement and/or monitoring of compliance with performance measures and performance indicators is to be undertaken using generally accepted methods that are appropriate to the environment and circumstances in which the feature or characteristic is located. These methods are to be fully described in the relevant management plans. In the event of a dispute over the appropriateness of proposed methods, the Secretary will be the final arbiter. Requirements under this condition may be met by measures undertaken in accordance with the Mine Subsidence Compensation Act 1961. <p>...</p>	<p style="text-align: center;">Section 7</p> <p style="text-align: center;">Sections 6</p> <p style="text-align: center;">Section 9</p>
Condition 77(g), Schedule 3	
<p>(g) include a Built Features Management Plan, which has been prepared in consultation with Resources Regulator and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which:</p> <ul style="list-style-type: none"> addresses in appropriate detail all items of key public infrastructure and other public infrastructure and all classes of other built features; has been prepared following appropriate consultation with the owner/s of potentially affected feature/s; recommends appropriate remedial measures and includes commitments to mitigate, repair, replace or compensate all predicted impacts on potentially affected built features in a timely manner; and in the case of all key public infrastructure, and other public infrastructure except roads, trails and associated structures, reports external auditing for compliance with ISO 31000 (or alternative standard agreed with the infrastructure owner) and provides for annual auditing of compliance and effectiveness during extraction of longwalls which may impact the infrastructure; 	<p style="text-align: center;">Section 4.1</p> <p style="text-align: center;">Section 4.4</p> <p style="text-align: center;">Sections 7 & 9</p> <p style="text-align: center;">Section 12.1</p>
Condition 77(n), Schedule 3	
<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 exceedance appears likely;</p>	Section 9
Condition 77(p), Schedule 3	
<p>(p) include a program to collect sufficient baseline data for future Extraction Plans.</p>	Section 12.3
Condition 78, Schedule 3	
<p>78. The Proponent shall ensure that the management plans required under conditions 77(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 style="text-align: center;">Section 4</p> <p style="text-align: center;">Section 7</p>

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Table 1 (Continued): Management Plan Requirements

Project Approval (05_0117) Condition	LW409-414 BFMP-SCR Section
Condition 3, Schedule 5	
<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"> • the relevant statutory requirements (including any relevant approval, licence or lease conditions); • the relevant limits or performance measures/criteria; • 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; <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"> • impacts and environmental performance of the project; • effectiveness of any management measures (see c above); <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"> • incidents; • complaints; • non-compliances with statutory requirements; and • exceedances of the impact assessment criteria and/or performance criteria; and <p>h) a protocol for periodic review of the plan.</p>	<p style="text-align: center;">Section 4.1</p> <p style="text-align: center;">Section 3</p> <p style="text-align: center;">Section 5</p> <p style="text-align: center;">Section 8</p> <p style="text-align: center;">Sections 7 & 9</p> <p style="text-align: center;">Sections 6, 8 & 12</p> <p style="text-align: center;">Section 9</p> <p style="text-align: center;">Sections 6 & 12</p> <p style="text-align: center;">Section 13</p> <p style="text-align: center;">Section 14</p> <p style="text-align: center;">Section 15</p> <p style="text-align: center;">Section 9</p> <p style="text-align: center;">Section 2</p>

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 the 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*;

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- *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 SADDLERS CREEK ROAD

4.1 BASELINE DATA

Saddlers Creek Road is an unsealed dirt road that runs east from Ulan Road and is directly undermined by LW412-414 (**Figure 4**). The depth of cover along Saddlers Creek Road varies from approximately 122 metres (m) to 136 m (**Attachment 1**).

4.2 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 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.

4.3 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 BFMP-SCR has incorporated the subsidence predictions and impacts as described below, in **Attachment 1** and **Technical Report 1** of the Extraction Plan.

A summary of the subsidence impacts and predictions (MSEC, 2024) is provided below:

- The predicted subsidence parameters due to the Extraction Plan Layout are the same as those for the Approved Layout. The potential subsidence movements and impacts based on the Extraction Plan Layout are therefore the same as those based on the Approved Layout.
- Saddlers Creek Road will experience the full range of subsidence movements from the extraction of LW412, LW413 and LW414. The potential impacts on Saddlers Creek Road, are expected to include cracking, stepping and rippling of the road surfaces.
- Saddlers Creek Road may also experience ponding and redirection of surface flow.

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- The expected duration of active subsidence with the extraction of each longwall panel is dependent on the rate of extraction, however based on rates of extraction at the Moolarben Coal Complex the most active period of vertical subsidence is approximately 2 weeks. Additional minor subsidence may occur outside this 2 week period, with the total period of active subsidence estimated to be a total of 4 weeks.

It is expected that Saddlers Creek Road can be maintained in serviceable condition with the implementation of the appropriate monitoring and management strategies (**Sections 6 and 7**).

4.4 RISK ASSESSMENT

In accordance with the *Extraction Plan Guideline* (DPE, 2022), potential risks and potential risk control measures and procedures have been considered for Saddlers Creek Road.

The proposed risk control measures and procedures have been incorporated where relevant in this LW409-414 BFMP-SCR and the program for implementation is summarised in **Table 3**.

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

Table 3: Program for Implementation of Proposed Risk Control Measures and Procedures

Risk Control Measure / Procedure		LW409-414 BFMP-SCR Section	Proposed Timing
Baseline Data / Validation			
1	Extraction Plan to include undertaking a visual inspection of the Saddlers Creek Road, in particular culverts, that may be affected by the mining of LW412-414.	Section 6.2	Prior to mining within 100 m of Saddlers Creek Road
2	Develop and implement communications strategy with affected landholders along Saddlers Creek Road regarding mining induced subsidence.	Sections 11.1	Prior to Secondary Extraction of LW409
Management / Monitoring / Response Measures			
3	Develop a TARP in the LW409-414 BFMP-SCR identifying triggers for Saddlers Creek Road.	Section 10 and Attachment 1	Complete
4	Develop strategy for maintaining the serviceability of Saddlers Creek Road.	Sections 6 and 7	Complete

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5.0 PERFORMANCE MEASURES

The performance measures specified in Table 15, Schedule 3 of Project Approval (05_0117) relevant to the Saddlers Creek Road, as a built feature, are listed in **Table 4**.

Table 4: Built Features Subsidence Impact Performance Measures

Feature	Subsidence Impact Performance Measure
Other infrastructure:	
Roads	Safe, serviceable and repairable unless the owner agrees otherwise in writing.

Note: Requirements regarding safety or serviceability do not prevent preventative or mitigatory actions being taken prior to or during mining in order to achieve or maintain these outcomes

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

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

Section 6 outlines the monitoring that will be undertaken to assess the impact of LW409-414 against the performance measures in relation to the Saddlers Creek Road. Management measures for the Saddlers Creek Road are outlined in **Section 7** and performance indicators for the performance measures are summarised in **Section 8**.

In addition, MCO has adopted the following performance indicator for Saddlers Creek Road: *“Maintain Saddlers Creek Road in a safe, serviceable and accessible condition (i.e. including during active subsidence, with the implementation of management measures)”*.

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6.0 MONITORING

A monitoring program has been developed in order to monitor the impacts of the extraction of LW409-414 on the Saddlers Creek Road to identify unsafe conditions or loss of serviceability during or after mining. Key components of the monitoring program are summarised in **Table 5**.

Table 5: Saddlers Creek Road Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Pre-mining			
Saddlers Creek Road – Visual inspection within 100 m of LW409-414.	Condition of road surface and culverts.	Prior to mining within 100 m of Saddlers Creek Road.	Underground Technical Services Manager.
UG4 subsidence monitoring lines, as described in the UG4 Longwalls 409 to 414 Subsidence Monitoring Program (LW409-414 SMP).	Installation of survey monitoring program and initial ground survey ('SCR Line'). Monitoring parameters include: <ul style="list-style-type: none"> • Easting; • Northing; • Vertical Subsidence; • Tilt; • Tensile Strain; and • Compressive Strain 	Prior to the secondary extraction of LW409.	Underground Technical Services Manager.
During and after mining			
UG4 subsidence monitoring lines, as described in the LW409-414 SMP.	Survey monitoring program for subsidence parameters measured along the 'SCR Line', including: <ul style="list-style-type: none"> • Easting; • Northing; • Vertical Subsidence; • Tilt; • Tensile Strain; and • Compressive Strain. 	Prior to the secondary extraction of LW412. Within 1 month of the first 300 m of secondary extraction past Saddlers Creek Road for each of LW412-414. Provide a copy of the results of the subsidence parameters measured along the 'SCR Line' to MWRC and Crown Lands upon request or exceedance of subsidence predictions (<i>unless otherwise agreed to by MWRC/Crown Lands</i>).	Underground Technical Services Manager.
Saddlers Creek Road – Visual inspection within 100 m of LW411.	Condition of road surface to confirm no impacts to road at this distance (i.e. between LW411 and Saddlers Creek Road).	Prior to the secondary extraction of LW412.	Underground Technical Services Manager.

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Table 5 (Continued): Saddlers Creek Road Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Saddlers Creek Road – Visual inspection within 100 m of LW412-414.	Regular visual inspections by the stand-by traffic control team (i.e. prior to each vehicle passing as well as at regular intervals during a 24 hour period, informed by location of longwall and observed impacts from previous monitoring) will target the identification of impacts to the surface and culverts including cracks, buckling and stepping to confirm ability to maintain safe, serviceable and accessible condition.	When the longwall face is 100 m prior to undermining Saddlers Creek Road until the longwall face is 300 m post-mining Saddlers Creek Road for each of LW412-414. If ground surveys identify an exceedance of the predicted subsidence monitoring parameters measured along the ‘SCR Line’.	Underground Technical Services Manager.
Saddlers Creek Road – Post-mining visual inspection within 100 m of LW412-414.	Condition of road surface and culverts to confirm permanent repair requirements.	Within 1 month of secondary extraction of 300 m past Saddlers Creek Road for each of LW412-414.	Underground Technical Services Manager.

Note: Copies of results of the visual inspections and survey monitoring program will be provided to MWRC and Crown Lands (unless otherwise agreed to by MWRC and Crown Lands).

The frequency of monitoring will be reviewed either:

- in accordance with the Annual Review; or
- if monitoring determines there has been no impact to Saddlers Creek Road and/or no exceedance of the performance measures listed in **Table 4**, MCO in consultation with MWRC and Crown Lands will review the frequency of this monitoring component; or
- if triggered as a component of the Contingency Plan as outlined in **Section 9** of this LW409-414 BFMP-SCR.

6.1 SUBSIDENCE PARAMETERS

Subsidence parameters measured by a survey line (‘SCR Line’) (i.e. Easting, Northing, vertical subsidence, tilt, tensile strain, compressive strain and compressive strain) associated with mining will be measured in accordance with the LW409-414 SMP.

In summary, surveys will be conducted to measure subsidence movements in three dimensions using a total station survey instrument. Subsidence movements (i.e. Easting, Northing, vertical subsidence, tilt, tensile strain, compressive strain and compressive strain) will be measured along subsidence lines that have been positioned across the general landscape.

Unless otherwise agreed with MWRC and Crown Lands, inspection sheets detailing the outcome of the subsidence impact monitoring program will be provided to MWRC and Crown Lands following confirmation of the results.

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6.2 SUBSIDENCE IMPACTS

A baseline visual inspection of Saddlers Creek Road will be conducted prior to mining within 100 m of Saddlers Creek Road to establish the condition of the road surface within 100 m of LW409-414.

The visual inspection will be conducted by MCO and will include recording of the condition of the road surface.

A copy of the visual inspection report will be provided to MWRC and Crown Lands, unless otherwise agreed with MWRC and Crown Lands.

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7.0 MANAGEMENT MEASURES

Saddlers Creek Road would be monitored regularly while it is being directly undermined (i.e. the duration of time from when the longwall face is 100 m prior to Saddlers Creek Road to when the longwall face is 300 m past Saddlers Creek Road) to identify if repairs are required. A stand-by work crew and equipment will undertake regular visual inspections (i.e. prior to each vehicle passing as well as at regular intervals during a 24 hour period, informed by location of longwall and observed impacts from previous monitoring) and maintenance as required to ensure the performance indicator is achieved (*i.e. maintain Saddlers Creek Road in a safe, serviceable and accessible condition*). Public access to Saddlers Creek Road will be controlled while it is being directly undermined to ensure it is safe before allowing traffic to pass.

The potential management measures in relation to the Saddlers Creek Road roadway include:

- road regrading;
- road releveling; and
- crack sealing/repair.

Permanent repairs that are required to ensure that the performance measure relevant to Saddlers Creek Road (i.e. safe, serviceable and repairable) is met will be undertaken after the longwall face has completed undermining Saddlers Creek Road for that longwall panel.

Follow-up inspections will be conducted to assess the effectiveness of the management measures implemented and the requirement for any additional management measures. A summary of management measures (if required) will be reported in the Annual Review. Key management actions and timings are summarised in **Table 6**.

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Table 6: Saddlers Creek Road Key Management Actions

Management Measure	Timing/Frequency	Responsibility
Pre-mining		
Notification to MWRC and Crown Lands prior to commencement of secondary extraction.	Prior to secondary extraction of LW409.	Underground Technical Services Manager.
	Prior to secondary extraction of LW412-414.	Underground Technical Services Manager.
Notification of Emergency Services of timing of road interruptions	Prior to mining within 100 m of Saddlers Creek Road.	Health and Safety Manager.
Prepare site setup for monitoring and repairs of Saddlers Creek Road.		Underground Technical Services Manager.
Publish notices in local newspapers.		Environment and Community Manager.
During Mining		
Notification to MWRC and Crown Lands on the progress of mining in relation to the road by weekly email.	While Saddlers Creek Road is being directly undermined.	Underground Technical Services Manager.
Notification to MWRC and Crown Lands during longwall mining of LW409-414.	If performance indicator for Saddlers Creek Road has not been met (i.e. Saddlers Creek Road is not maintained in a safe, serviceable and accessible condition during active subsidence period) and is not repairable. If ground surveys identify an exceedance of the predicted subsidence monitoring parameters measured along the 'SCR Line'.	Underground Technical Services Manager.
Controlling public access to Saddlers Creek Road to ensure it is safe before allowing traffic to pass.	While Saddlers Creek Road is being directly undermined.	Underground Technical Services Manager.
Stand-by work crew and equipment to undertake regular visual inspections (i.e. prior to each vehicle passing as well as at regular intervals during a 24 hour period, informed by location of longwall and observed impacts from previous monitoring) and maintenance as required to maintain a safe, serviceable and accessible condition.	While Saddlers Creek Road is being directly undermined.	Underground Technical Services Manager.
Implement TARP (Attachment 2).	During LW412-414 extraction.	Underground Technical Services Manager.
Provision of inspection sheets detailing the outcome of the subsidence impact monitoring program to MWRC and Crown Lands (unless otherwise agreed with MWRC and Crown Lands).	If ground surveys identify an exceedance of the predicted subsidence monitoring parameters and/or subsidence related impact inspections. After completion of secondary extraction of 300 m past Saddlers Creek Road for each of LW412-414.	Underground Technical Services Manager.

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Table 6 (Continued): Saddlers Creek Road Key Management Actions

Management Measure	Timing/Frequency	Responsibility
Remediation of Saddlers Creek Road, including regrading, releveling and crack sealing/repair.	During undermining of Saddlers Creek Road for each LW412-414, when subsidence impacts are identified. Additional remediation measures will continue if further visual inspections identify further subsidence impacts.	Underground Technical Services Manager.
Post-mining		
Post-mining remediation of Saddlers Creek Road, including regrading, releveling and crack sealing/repair.	If post-mining visual inspection identifies requirement to implement permanent remediation/repairs.	Underground Technical Services Manager.
Controlling public access to Saddlers Creek Road to ensure it is safe before allowing traffic to pass.	Until remediation of Saddlers Creek Road has been completed, and visual inspections confirm no further subsidence impacts.	Underground Technical Services Manager.
Notification to MWRC and Crown Lands to inform longwall mining of LW409-414 is completed.	Following completion of mining LW414 and any post-mining remediation.	Underground Technical Services Manager.

Note: direct undermining of Saddlers Creek Road is the duration of time when the longwall face is 100 m prior to Saddlers Creek Road to when the longwall face is 300 m past Saddlers Creek Road.

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8.0 ASSESSMENT OF PERFORMANCE INDICATORS AND MEASURES

In accordance with Condition 77(d), Schedule 3 of Project Approval (05_0117), performance indicators have been developed for the performance measures listed in **Table 4 (Section 5)**.

The performance indicators proposed to ensure that the performance measures for Saddlers Creek Road in relation to subsidence are achieved is: *“Maintain Saddlers Creek Road in a safe, serviceable and accessible condition (i.e. including during active subsidence, with the implementation of management measures)”*.

Monitoring conducted to inform the assessment of secondary extraction of LW409-414 against the performance indicators (for the performance measures relevant to the Saddlers Creek Road as a built feature) is outlined in **Section 6**.

Assessment of monitoring results against the performance indicators and performance measure would include comparison against the baseline visual inspection to confirm any changes were not present prior to the commencement of mining at UG4.

If the performance measure or performance indicator is considered to have been exceeded, the Contingency Plan outlined in **Section 9** of this LW409-414 BFMP-SRC will be implemented.

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9.0 CONTINGENCY PLAN

In the event the performance indicator relevant to the Saddlers Creek Road as a built feature, summarised in **Table 4**, are considered to have been exceeded or are likely to be exceeded, MCO will implement the following Contingency Plan:

- The observation will be reported to the Underground Technical Services Manager or the Environment and Community Manager within 24 hours.
- The likely exceedance will be reported in an Incident Report (refer to the Extraction Plan).
- MCO will provide the Incident Report to relevant stakeholders (i.e. DPPI, the Resources Regulator, MWRC and Crown Lands).
- 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 9.1**), 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 DPPI, MWRC, Crown Lands and the Resources Regulator.
- This LW409-414 BFMP-SCR and the performance indicators will be reviewed to adequately manage future potential impacts within the limits of Project Approval (05_0117).

MCO will comply with the *Coal Mine Subsidence Compensation Act 2017* (formerly *Mine Subsidence Compensation Act 1961*) in the event that property damages occur as a result of mining LW409-414.

9.1 CONTINGENCY MEASURES

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). Potential contingency measures that could be considered in the event the performance measure for the Saddlers Creek Road is exceeded are summarised in **Table 7**. Temporary road closure procedures (if required) would be developed and carried out in consultation with MWRC and Crown Lands.

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Table 7: Potential Contingency Measures

Environmental Consequence	Potential Contingency Measures	
	Measure	Description
Impact on:		
Road Surface that is not safe, serviceable or repairable.	Repair road and restore access, with works generally commencing within approximately 30 minutes of identification of any impact. Provide notification to MWRC and Crown Lands <i>(unless otherwise agreed to by MWRC and Crown Lands).</i>	Temporary closure of the road to implement contingency measures including (but not limited to): <ul style="list-style-type: none"> • Installation of temporary physical treatments (e.g. rubber mats). • Consideration of alternate access routes, in consultation with MWRC, Crown Lands and the affected private landholder.

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10.0 TRIGGER ACTION RESPONSE PLAN – MANAGEMENT TOOL

The framework for the various components of this LW409-414 BFMP-SCR are summarised in the TARP shown in **Attachment 2**. The TARP illustrates how the various predicted subsidence impacts, monitoring components, performance measures, and responsibilities are structured to achieve compliance with the relevant statutory requirements, and the framework for management and contingency actions.

The TARP comprises:

- baseline conditions;
- predicted subsidence impacts;
- trigger levels from monitoring to assess performance; and
- triggers that flag implementation of contingency measures.

The TARP system provides a simple and transparent snapshot of the monitoring of performance and the implementation of management and/or contingency measures.

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11.0 ROLES AND RESPONSIBILITIES

Key responsibilities of MCO personnel in relation to this LW409-414 BFMP-SCR are summarised in **Table 8**. Responsibilities may be delegated as required.

Table 8: Responsibility Summary

Responsibility	Task
General Manager	<ul style="list-style-type: none"> Ensure resources are available to MCO personnel to facilitate the completion of responsibilities under this LW409-414 BFMP-SCR.
Underground Technical Services Manager	<ul style="list-style-type: none"> Ensure the LW409-414 SMP is implemented. Ensure monitoring required under this LW409-414 BFMP-SCR is carried out within specified timeframes, adequately checked and processed and prepared to the required standard. Undertake relevant monitoring and implementation of management measures summarised in Tables 5 and 6 respectively.
Environment and Community Manager	<ul style="list-style-type: none"> Liaise with relevant stakeholders regarding subsidence impact management and related environmental consequences.
Registered Mine Surveyor	<ul style="list-style-type: none"> Undertake all subsidence monitoring to the required standard within the specified timeframes and ensure data are adequately checked, processed and recorded.

11.1 KEY CONTACTS

The details of key contacts and phone numbers in relation to this LW409-414 BFMP-SCR are summarised in **Table 9**.

Table 9: Key Personnel Contact Details

Organisation	Position	Phone Number
MCO	Underground Technical Services Manager	02 6376 1500
	Environment and Community Manager	02 6376 1500
	Moolarben Coal Hotline	1800 556 484
MWRC	General Manager	02 6378 2850
	Manager Works	02 6378 2920 or 0428 725 802
Crown Lands	Projects Manager, Regional Projects Greater Sydney & Commercial	0497 629 288

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12.0 ANNUAL REVIEW, REGULAR REPORTING AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

12.1 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 BFMP-SCR) 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**, this LW409-414 BFMP-SCR 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.

12.2 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.

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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.

12.3 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 BFMP-SCR, will inform the appropriate type and frequency of monitoring of the assets relevant to any future Extraction Plan at the Moolarben Coal Complex.

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13.0 INCIDENTS

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

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

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

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

MCO will notify the Secretary of DPHI and any other relevant agencies of any incident associated with the 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 the LW409-414, MCO will notify the Secretary of DPHI 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 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.

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14.0 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.

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15.0 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 14**, MCO will notify the Secretary of the DPHI, and any other relevant agencies, of any incident associated with LW409-414 as soon as practicable 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), MLs 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 Yancoal’s website.

As described in **Section 13.2**, the most recent independent environmental audit was conducted in February 2022, 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.

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16.0 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*.

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ATTACHMENT 1

**MOOLARBEN COAL OPERATIONS – LONGWALLS 409 TO 414 SUBSIDENCE PREDICTIONS AND
IMPACT ASSESSMENT FOR SADDLERS CREEK ROAD**

Document	Version	Issue Date	Status	Author
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2nd August 2024

Liam Mildon
Underground Technical Services Manager
Moolarben Coal Operations Pty Ltd
Locked Bag 2003
Mudgee NSW 2850

Ref: MSEC1426-01

Dear Liam,

RE: Moolarben Coal Operations – Longwalls 409 to 414 - Subsidence predictions and impact assessments for the Mid-Western Regional Council / Crown Land Infrastructure Saddlers Creek Road

1. Background

Moolarben Coal Operations Pty Limited (MCO) operates the Moolarben Coal Complex (MCC), which is located approximately 40 kilometres north east of Mudgee in New South Wales (NSW). MCO has been granted approval to develop Stages 1 and 2 of the Moolarben Coal Project (MCP) under the *Environmental Planning and Assessment Act 1979*. Approval for Stage 1 of the MCP (05_0117) was granted by the Minister for Planning on 6 September 2007. Approval for Stage 2 of the MCP (08_0135) was granted on 30 January 2015.

The MCC includes four approved open cut mines, (known as Open Cut 1 mine (OC1), Open Cut 2 mine (OC2), Open Cut 3 mine (OC3) and Open Cut 4 mine (OC4)), and three approved underground mines, (known as Underground Area 1 (UG1), Underground Area 2 (UG2) and Underground Area 4 (UG4)) and the associated infrastructure.

Underground longwall mining operations in UG4 commenced in July 2022 and MCO is currently extracting Longwall 405. The layout of Longwalls 409 to 414, is referred to as the *Extraction Plan Layout* in this report.

Saddlers Creek Road is located within Crown Lands and is managed by Mid-Western Regional Council. Saddlers Creek Road crosses east-west through the mining area from Ulan Road to private property. Ulan Road is located to the west of the Longwall 409 to 414 mining area.

Saddlers Creek Road is an unsealed dirt road that crosses the northern ends of Longwalls 412 to 414. A picture of Saddlers Creek Road is shown in Figure 1.

This letter report summarises the predicted subsidence movements and the assessed subsidence impacts for Saddlers Creek Road based on the Extraction Plan Layout. In doing so this letter considers potential subsidence induced mechanisms of impact and concludes with a summary of the impact assessment.

The location of Saddlers Creek Road, MCO mine layout and other surface features are shown in the attached Drawing No. MSEC1426-01.



Figure 1 Saddlers Creek Road

2. Study Area

A Study Area is defined around the longwall layout as the surface area that is likely to be affected by the proposed mining of Longwalls 409 to 414. The extent of the Study Area is calculated by the further extent a 26.5° angle of draw line and the predicted vertical limit of subsidence, taken as the 20 mm subsidence contour. The Study Area boundary is shown in MSEC1426-01.

The length of Saddlers Creek Road within the Study Area is approximately 1,090 m. The depth of cover beneath the road to the extracted seam varies from approximately 122 m above Longwall 412, to 136 m above Longwall 413.

3. Predicted Subsidence Parameters

Saddlers Creek Road will be mined beneath by Longwalls 412 to 414. The predicted profiles of vertical subsidence, tilt and curvature along Saddlers Creek Road, resulting from the extraction of Longwalls 409 to 414, are shown in Figure 2. The predicted incremental profiles along the prediction line, due to the extraction of each of the longwalls, are shown as dashed black lines. The predicted total profiles along the prediction line, after the extraction of each of the longwalls based on the Extraction Plan Layout, are shown as solid blue lines.

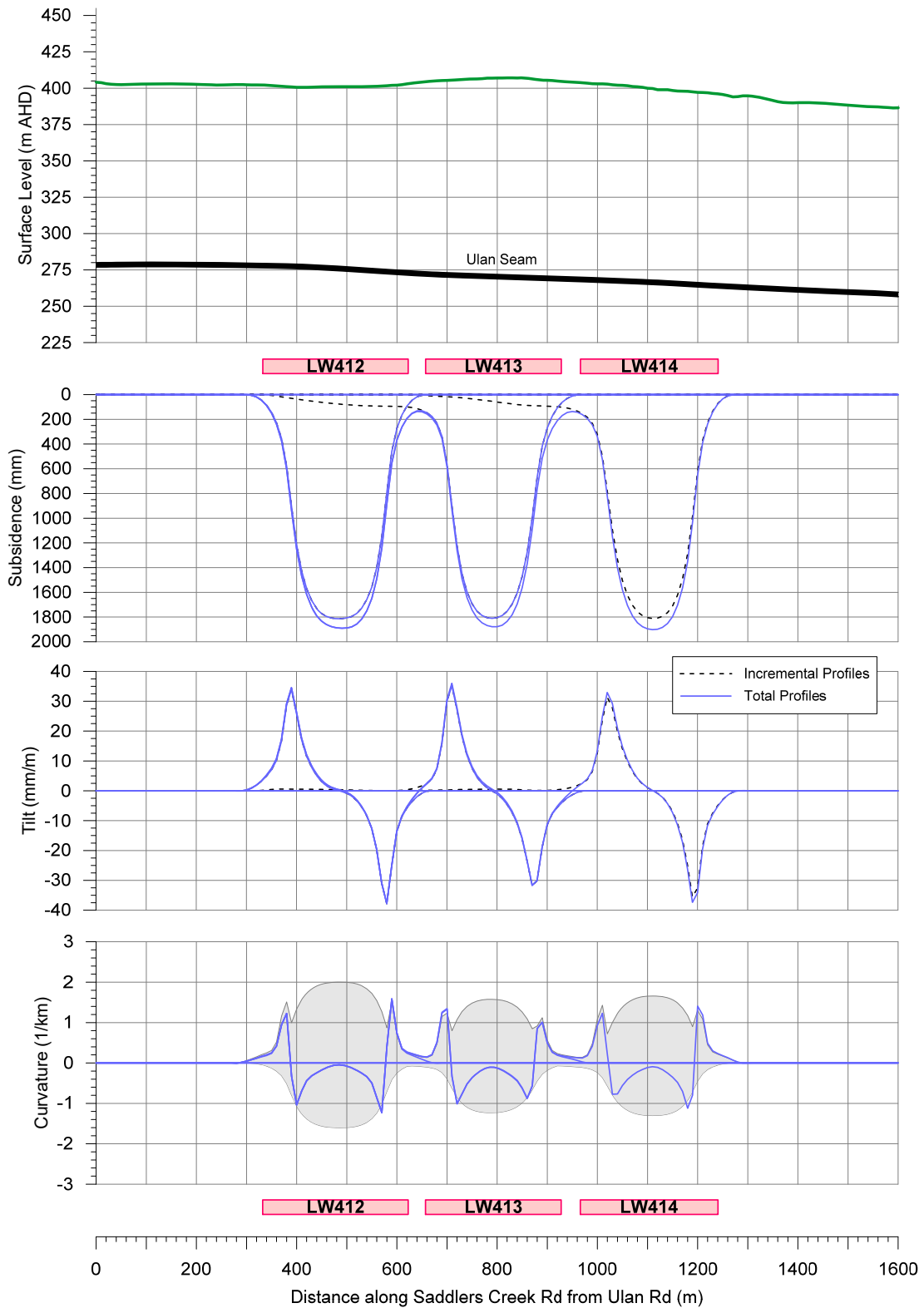


Figure 2 Predicted Profiles of Conventional Subsidence, Tilt and Curvature along Saddlers Creek Rd

A summary of the maximum predicted values of total conventional subsidence, tilt and curvature for Saddlers Creek Road, resulting from the extraction of Longwalls 409 to 414 for the Extraction Plan Layout, is provided in Table 1. The predicted tilts provided in this table are the maxima after the completion of all the longwalls. The predicted curvatures are the maxima at any time during or after the extraction of the longwalls.

Table 1 Maximum Predicted Total Conventional Subsidence, Tilt and Curvature for the Saddlers Creek Road Resulting from the Extraction of Longwalls 409 to 414

Maximum Predicted Total Conventional Subsidence (mm)	Maximum Predicted Total Conventional Tilt (mm/m)	Maximum Predicted Total Conventional Hogging Curvature (km ⁻¹)	Maximum Predicted Total Conventional Sagging Curvature (km ⁻¹)
1900	40	2.0	1.6

Predicted Strains

The prediction of strain is more difficult than the predictions of subsidence, tilt and curvature. The reason for this is that strain is affected by many factors, including ground curvature and horizontal movement, as well as local variations in the near surface geology, the locations of pre-existing natural joints at bedrock, and the depth of bedrock. Survey tolerance can also represent a substantial portion of the measured strain, in cases where the strains are of a low order of magnitude. The profiles of observed strain, therefore, can be irregular even when the profiles of observed subsidence, tilt and curvature are relatively smooth.

For this reason, the predicted strains have been based on statistical analyses of strains measured in the NSW Coalfields to account for this variability.

It has been found, for single-seam mining conditions, that applying a constant factor to the predicted maximum curvatures provides a reasonable prediction for the maximum normal or conventional strains. The locations that are predicted to experience hogging or convex curvature are expected to be net tensile strain zones and locations that are predicted to experience sagging or concave curvature are expected to be net compressive strain zones. In the Newcastle, Hunter and Western Coalfields, it has been found that a factor of 10 provides a reasonable relationship between the predicted maximum curvatures and the predicted maximum conventional strains, for single-seam mining conditions.

At a point, however, there can be considerable variation from the linear relationship, resulting from non-conventional movements or from the normal scatters which are observed in strain profiles. When expressed as a percentage, observed strains can be many times greater than the predicted conventional strain for low magnitudes of curvature.

The range of potential strains above the longwalls has been assessed using monitoring data from previously extracted panels in the Hunter, Newcastle and Western Coalfields, for single-seam conditions, where the longwall width-to-depth ratios and extraction heights were similar to those of the Extraction Plan layout.

The data used in the analysis of observed strains included those resulting from both conventional and non-conventional anomalous movements, but did not include those resulting from valley related movements. The strains resulting from damaged or disturbed survey marks have also been excluded.

For linear features such as roads, cables and pipelines, it is appropriate to assess the frequency of the maximum observed strains along whole monitoring lines, rather than for individual survey bays. That is, an analysis of the maximum strains measured anywhere along the monitoring lines, regardless of where the strain actually occurs.

The histogram of maximum observed total tensile and compressive strains measured anywhere along the monitoring lines, at any time during or after mining, is provided in Figure 3.

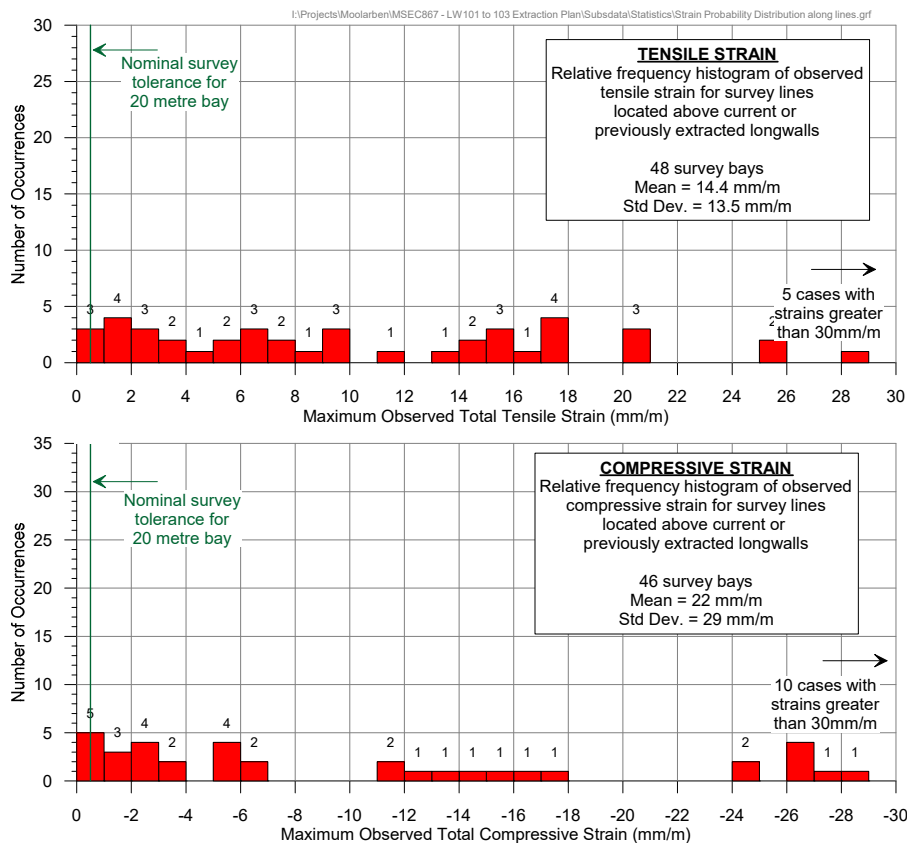


Figure 3 Distributions of Measured Maximum Tensile and Compressive Strains Anywhere along the Monitoring Lines in the Hunter, Newcastle and Western Coalfields

It can be seen from the above figure, that 50 % of the monitoring lines have recorded maximum total tensile strains of 10 mm/m, or less, and 75 % of the monitoring lines have recorded maximum total tensile strains of 20 mm/m, or less. 43 % of the monitoring lines have recorded maximum compressive strains of 10 mm/m, or less, and 60 % of the monitoring lines have recorded maximum compressive strains of 20 mm/m, or less.

The predicted strains along Saddlers Creek Road are provided in Table 2. The values have been provided for conventional movements (based on 10 times the curvature) and for non-conventional anomalous movements (based on the statistical analysis provided above).

Table 2 Predicted Strains for the Saddlers Creek Road based on Conventional and Non-Conventional Anomalous Movements

Type	Conventional based on 10 times Curvature (mm/m)	Non-conventional (mm/m)
Tension	20	20
Compression	16	20

Predictions of Strain Above Solid Coal

For the surface features located outside the extracted longwalls, above solid coal, the survey database has also been analysed to extract the maximum tensile and compressive strains that have been measured at any time during mining for survey bays that were located beyond the goaf edges of the mined panels and positioned on unmined areas of coal, i.e. outside the longwall panels, but within 200 m of the nearest longwall goaf edge.

The histogram of the maximum observed tensile and compressive strains measured in survey bays above solid coal is provided in Figure 4. The probability distribution functions, based on fitted Generalised Pareto Distribution (GPD), have also been shown in this figure.

The 95 % confidence levels for the maximum total strains that the individual survey bays *above solid coal* experienced at any time during mining are 3.3 mm/m tensile and 3.0 mm/m compressive. The 99 % confidence levels for the maximum total strains that the individual survey bays above solid coal experienced at any time during mining are 9.2 mm/m tensile and 14.4 mm/m compressive.

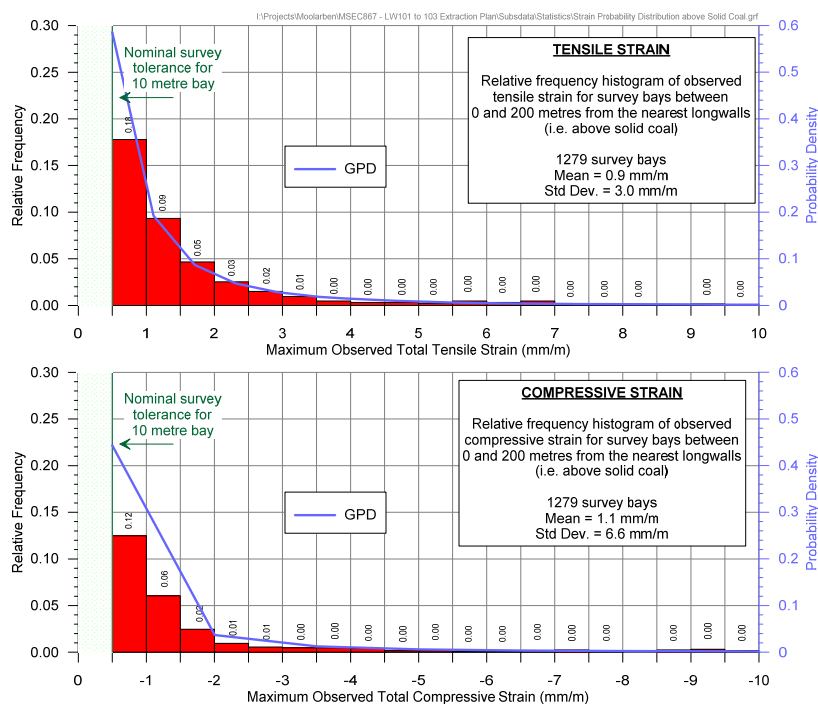


Figure 4 Distributions of the Measured Maximum Tensile and Compressive Strains in the Hunter, Newcastle and Western Coalfields for Survey Bays located above Solid Coal within 200 m of the nearest longwall

Potential for Non-Conventional Movements

It is believed that most non-conventional ground movements are the result of the reaction of near surface strata to increased horizontal compressive stresses due to mining operations. Some of the geological conditions that are believed to influence these irregular subsidence movements are the blocky nature of near surface sedimentary strata layers and the possible presence of unknown faults, dykes or other geological structures, cross bedded strata, thin and brittle near surface strata layers and pre-existing natural joints. The presence of these geological features near the surface can result in a localised bump in an otherwise smooth subsidence profile and these bumps are usually accompanied by locally increased tilts and strains.

Even though it may be possible to attribute a reason behind most observed non-conventional ground movements, there remains some observed irregular ground movements that still cannot be explained with the available geological information. The term “anomaly” is therefore reserved for those non-conventional ground movement cases that were not expected to occur and cannot be explained by any of the above possible causes.

It is not possible to predict the locations and magnitudes of non-conventional anomalous movements. In some cases, approximate predictions for the non-conventional ground movements can be made where the underlying geological or topographic conditions are known in advance.

The likelihood of non-conventional anomalous movements reduces with increasing distance away from the longwall panels.

4. Impact Assessment

Saddlers Creek Road will experience the full range of subsidence movements from the extraction of Longwalls 412, 413 and 414. The potential impacts on Saddlers Creek Road, are expected to include cracking, stepping and rippling of the road surfaces. The road may also experience ponding and redirection of surface flow. The below graphs depict the pre-mining and predicted post-mining surface levels and grades along Saddlers Creek Road in Figure 5 and Figure 6 respectively. It can be seen in Figure 6 that the maximum changes in grade along the road will occur near the edges of each of the extracted longwalls. There is an increased likelihood of ponding where post-mining grades are reversed or near zero grade.

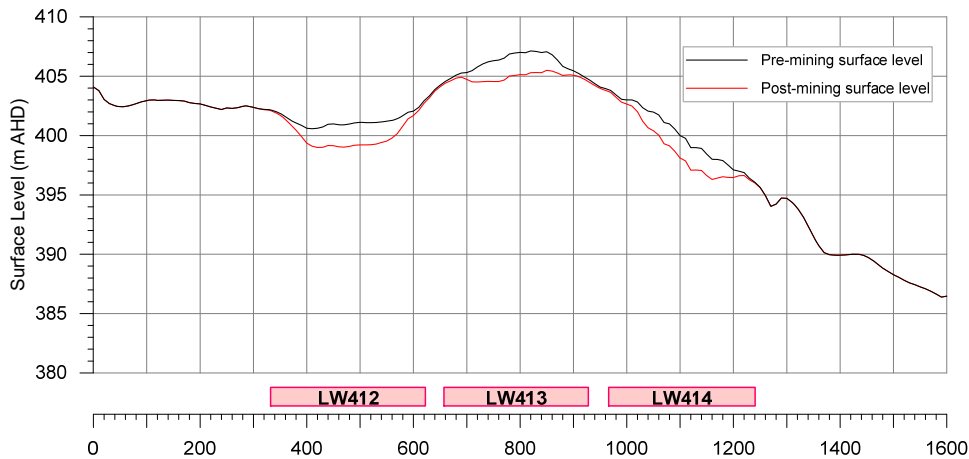


Figure 5 Surface Levels along Saddlers Creek Road

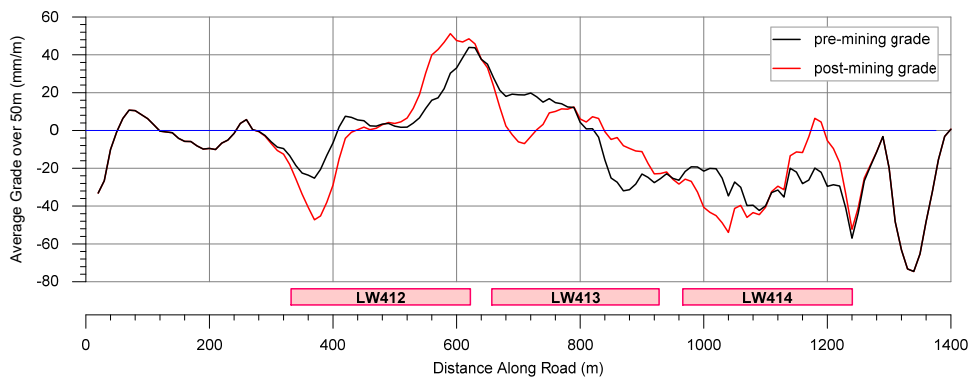


Figure 6 Average Grade along Saddlers Creek Road

Saddlers Creek Road is an unsealed track. Impacts to the road can be remediated with earthworks, regrading and releveling the roads using standard road maintenance techniques.

Traffic volumes along Saddlers Creek Road are relatively low. The management approach for maintaining Saddlers Creek Road in a safe and serviceable condition will include an active maintenance program to address impacts during the periods of active subsidence for each of the Longwalls 412, 413 and 414. Alternatives to an active maintenance program could include alternate routes and/or periods of temporary road closure.

The expected duration of active subsidence beneath Saddlers Creek Road with the extraction of each longwall panel is dependent on the rate of extraction, however based on rates of extraction at MCO the most active period of vertical subsidence is approximately 2 weeks at a single location. A monitoring site above previously extracted Longwall 401 provides an example of the expected duration of active subsidence, since panel geometry and depth of cover are similar to those beneath Saddlers Creek Road. A plot of the development of vertical subsidence and the distance to the longwall face at the monitoring site during the extraction of Longwall 401 is shown in Figure 7.

The plot shows the most active subsidence period to be approximately 2 weeks, with additional minor subsidence occurring from approximately 100 m prior to the face passing beneath the monitoring site, to approximately 300 m beyond the monitoring site, over a total of approximately 4 weeks.

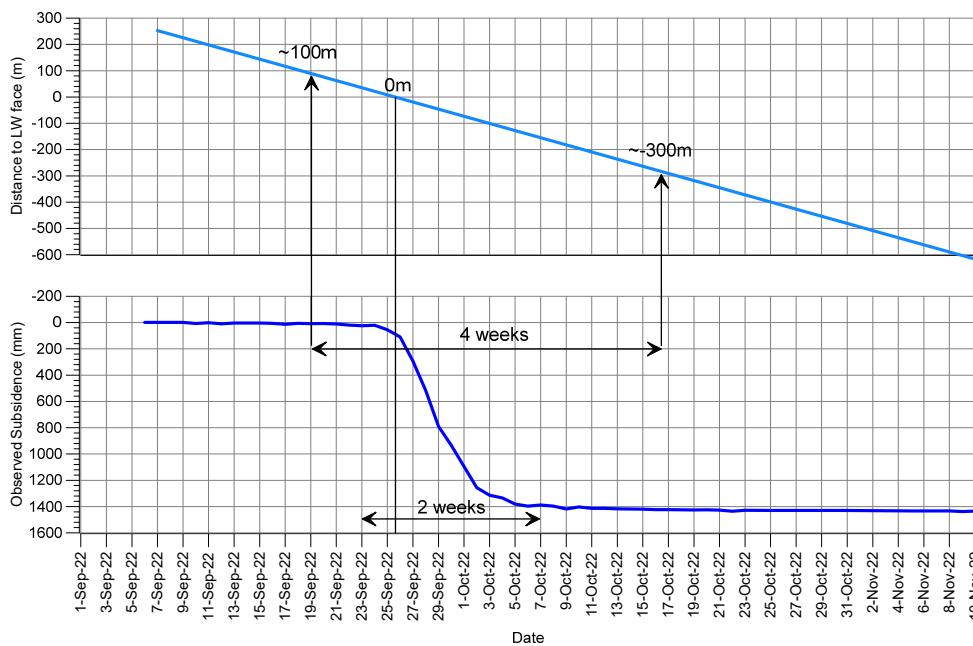


Figure 7 Development of vertical subsidence during Longwall 401

It is noted that the estimated duration of 4 weeks is based on a single location. Saddlers Creek Road follows a curved route and is angled to the longwall alignment, therefore the duration may be longer since the longwall face will extract for some distance directly beneath the road. The management period should be implemented from when the longwall face is approximately 100 m before the road, to approximately 300 m beyond the road.

It is expected that the potential impacts to Saddlers Creek Road can be managed with the implementation of the necessary monitoring and management strategies in consultation with the Mid-Western Regional Council.

5. Summary

Saddlers Creek Road is located within the Study Area for Longwalls 409 to 414 and will be mined beneath by Longwalls 412, 413 and 414.

The road will experience the full range of subsidence movement from the extracted longwalls as they mine beneath the road. The road is an unsealed track and can be readily repaired using standard road maintenance techniques.

Unless alternative routes can be provided during active mining, it is recommended that an active monitoring and maintenance program is developed to ensure the road remains safe and serviceable during the extraction of the longwalls. The active maintenance period should be implemented from when the longwall face is approximately 100 m before the road, to approximately 300 m beyond the road.

Yours sincerely

Peter DeBono

Attachments:

Drawing No. MSEC1426-01 – Longwalls 409 to 414 – Saddlers Creek Road



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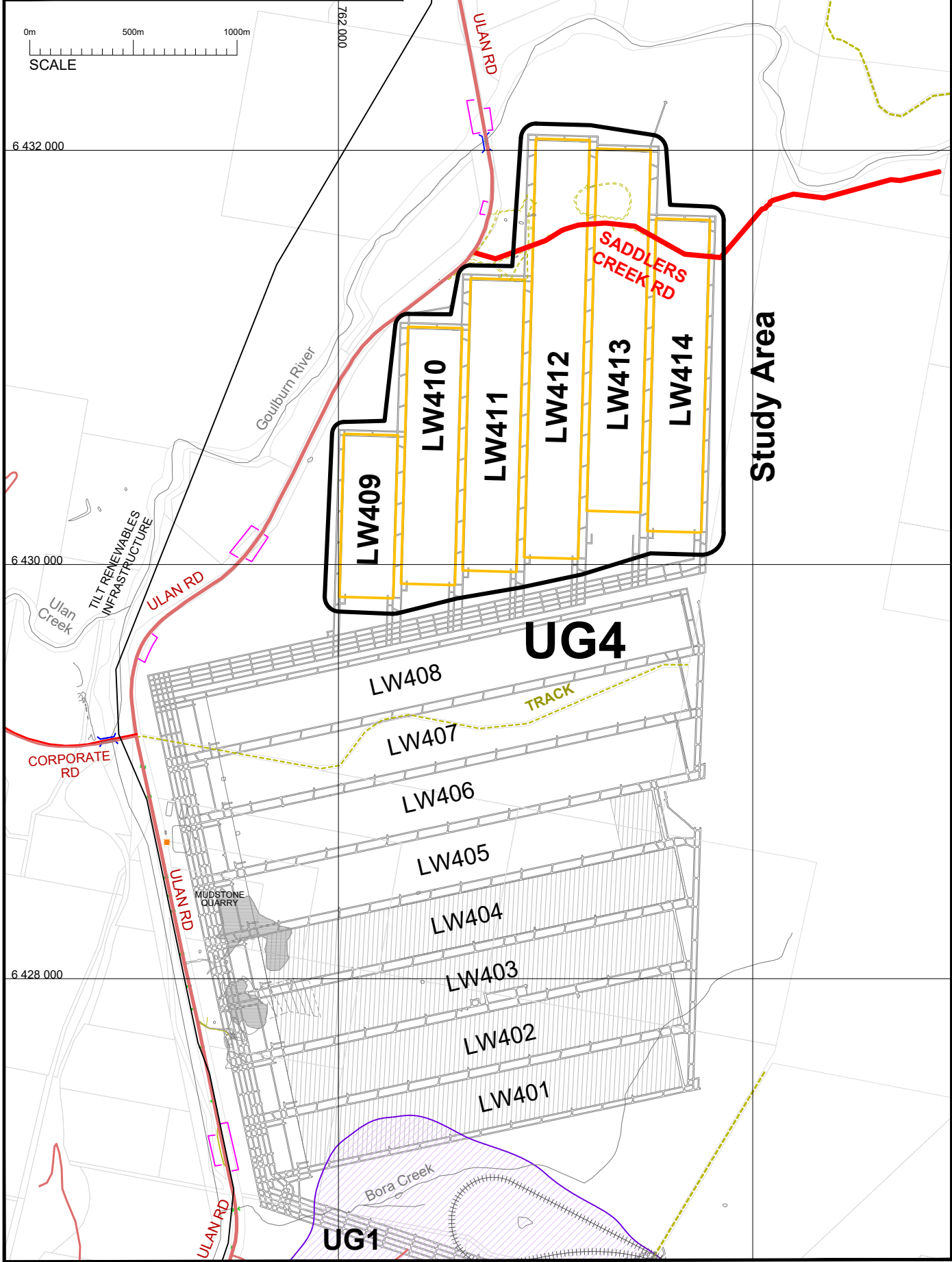
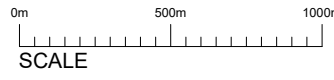
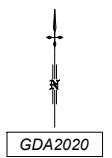


MOOLARBEN COAL PROJECT
 UG4 LW409 TO LW 414
 MWRC INFRASTRUCTURE
 SADDLERS CREEK ROAD

DATE: 2 Aug 2024	SCALE: as shown	DRAWING No: MSEC1426-01	Rev No B
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LEGEND

- Inferred Extents of Unconsolidated Sediments
- Sealed Roads
- Unsealed Roads
- Tracks
- Bridges
- Culverts
- Cuttings



ATTACHMENT 2

**UG4 LONGWALLS 409 TO 414
BUILT FEATURES MANAGEMENT PLAN – SADDLERS CREEK ROAD
TRIGGER ACTION RESPONSE PLAN**

Document	Version	Issue Date	Status	Author
MCO_BFMP_SCR	3	April 2026	Approved	MCO

Condition	Normal		Level 1	Level 2
	Baseline Conditions	Predicted Impacts	Implement Management Measures	Restoration/Contingency Phase
Trigger	Saddlers Creek Road and associated infrastructure is safe, serviceable and repairable or as otherwise identified by pre-mining inspection.	Subsidence effect on Saddlers Creek Road. (i.e. subsidence movements from the extraction of LW412-414, including cracking, stepping and rippling of the road surfaces).	Monitoring identifies impacts that require management, but the performance indicator has not been exceeded and is not likely to be exceeded.	If the performance indicator relevant to Saddlers Creek Road are exceeded, or are likely to be exceeded (i.e. that Saddlers Creek Road is no longer maintained in a safe, serviceable and accessible condition).
Action	<p>Establish baseline data, including:</p> <ul style="list-style-type: none"> Pre-mining visual inspection. Pre-extraction subsidence survey as per the UG4 Longwalls 409 to 414 Subsidence Monitoring Program. 	<p>Conduct monitoring as described in Section 6, including:</p> <ul style="list-style-type: none"> Ground survey of the subsidence effects monitoring line ‘SCR Line’. Visual inspection of Saddlers Creek Road within 100 m of LW411 to confirm level of impact. Subsidence impact inspections, targeting the identification of: <ul style="list-style-type: none"> impacts to the surface including cracks, buckling and stepping; and impacts to the visible surfaces of pipes/culverts including cracking, buckling, shearing and collapse. Visual inspection of the road surface and condition of culverts. 	<p>Conduct management measures as described in Section 7, including:</p> <ul style="list-style-type: none"> Controlling public access to Saddlers Creek Road to ensure it is safe before allowing traffic to pass. Stand-by work crew and equipment to undertake regular visual inspections (i.e. prior to each vehicle passing as well as at regular intervals during a 24 hour period, informed by location of longwall and observed impacts from previous monitoring) and implement temporary repairs as required. 	<p>Contingency Plan implemented (with regard to the specific circumstances of the subsidence impact). In summary:</p> <ul style="list-style-type: none"> The observation will be reported to the Underground Technical Services Manager or the Environment and Community Manager within 24 hours. The likely exceedance will be reported in an Incident Report (refer to the Extraction Plan). MCO will provide the Incident Report to relevant stakeholders (i.e. DPPI, the Resources Regulator, MWRC and Crown Lands). 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 9.1), 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 DPPI, MWRC, Crown Lands and the Resources Regulator. The LW409-414 BFMP-SCR and the performance indicators will be reviewed to adequately manage future potential impacts within the limits of Project Approval (05_0117).
Frequency	<ul style="list-style-type: none"> Pre-mining visual inspection: <ul style="list-style-type: none"> Prior to mining within 100 m of Saddlers Creek Road. Pre-extraction subsidence survey: <ul style="list-style-type: none"> Prior to secondary extraction of LW409. 	<ul style="list-style-type: none"> Ground survey of the subsidence effects monitoring ‘SCR Line’: <ul style="list-style-type: none"> Prior to the secondary extraction of LW412. Within 1 month of secondary extraction of 300 m past Saddlers Creek Road for each of LW412-414. Visual inspection within 100 m of LW411: <ul style="list-style-type: none"> Prior to the secondary extraction of LW412. Regular visual monitoring of road surface and conditions of culverts: <ul style="list-style-type: none"> While Saddlers Creek Road is being directly undermined (i.e. the longwall face is between 100 m before to 300 m after undermining Saddlers Creek Road). If ground surveys identify an exceedance of the predicted subsidence monitoring parameters measured along the ‘SCR Line’. Post-mining visual inspection of road surface and culverts: <ul style="list-style-type: none"> Within 1 month of secondary extraction of 300 m past Saddlers Creek Road for each of LW412-414. 	<ul style="list-style-type: none"> To be implemented while Saddlers Creek Road is being directly undermined (i.e. the longwall face is between 100 m before to 300 m after undermining Saddlers Creek Road), and until remediation has been completed and visual inspections confirm no further subsidence impacts. 	<p>To be implemented following identification of an exceedance of the performance indicator, or if the performance indicator is likely to be exceeded (i.e. that Saddlers Creek Road is no longer maintained in a safe, serviceable and accessible condition).</p>
Position of Decision Making	<ul style="list-style-type: none"> Underground Technical Services Manager. 	<ul style="list-style-type: none"> Underground Technical Services Manager. 	<ul style="list-style-type: none"> Underground Technical Services Manager. 	<ul style="list-style-type: none"> Underground Technical Services Manager. MWRC – General Manager (or delegate). Crown Lands – Projects Manager, Regional Projects Greater Sydney & Commercial (or delegate).

Document	Version	Issue Date	Status	Author
MCO_BFMP_SCR	3	April 2026	Approved	MCO