UG1 LONGWALLS 101 TO 105 BUILT FEATURES MANAGEMENT PLAN MID-WESTERN REGIONAL COUNCIL

Version	Issue Date	Approval Date	Description	Author(s)	Review Team
1	September 2017	September 2017	Approved	MCO and MSEC	Environmental Department
2	June 2020	June 20	Inclusion of Longwalls 104-105	MCO	UG Technical Services

Approved: S.J. Archinal Date: ___11/06/2020__

Document	Version	Issue	Effective	Review	Author	Approved
MCO_BFMP_MWRC	2	Jun 20	Jun 20	Jun 21	MCO	S. Archinal

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

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

Mining operations at the Moolarben Coal Complex are currently approved until 31 December 2038 in accordance with Project Approval (05_0117) (Moolarben Coal Project Stage 1) (as modified) and Project Approval (08_0135) (Moolarben Coal Project Stage 2) (as modified).

This UG1 Longwalls 101 to 105 Built Features Management Plan – Mid-Western Regional Council (LW101-105 BFMP-MWRC) forms a part of the Extraction Plan for Longwalls 101 to 105 (herein referred to as Longwalls 101-105) of the approved UG1 Underground Mine.

1.1 PURPOSE AND SCOPE

Purpose: This LW101-105 BFMP-MWRC outlines the management of potential subsidence impacts of the proposed secondary workings described in the Extraction Plan on the existing Ulan-Wollar Road.

Scope: This LW101-105 BFMP-MWRC covers the section of the Ulan-Wollar Road within and proximal to the Study Area[1] and immediate surrounds, which relates to the extent of subsidence effects resulting from the secondary extraction of Longwalls 101-105 (Figure 4).

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

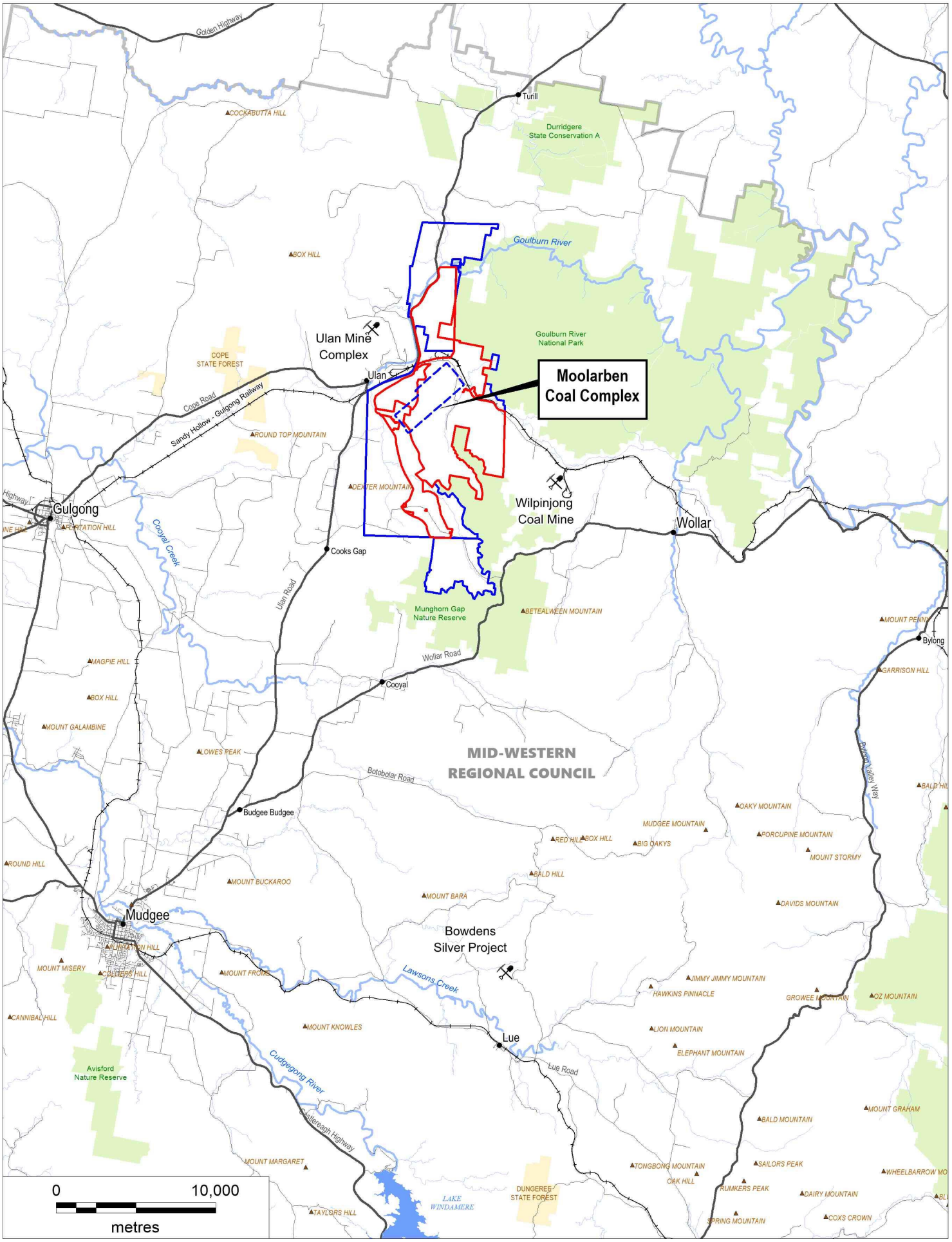


Figure 1
Regional Location

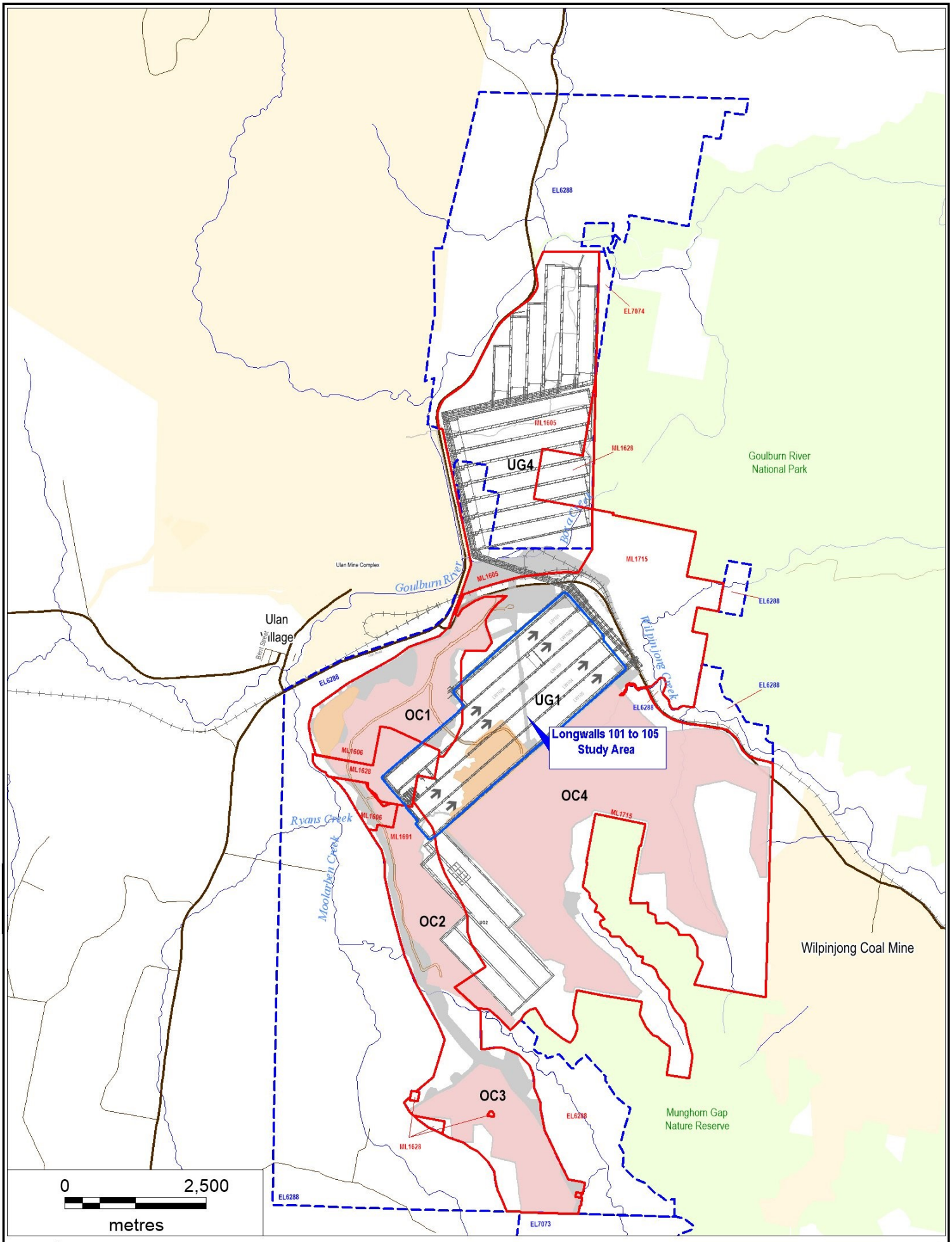


Figure 2
Moolarben Coal Complex Layout

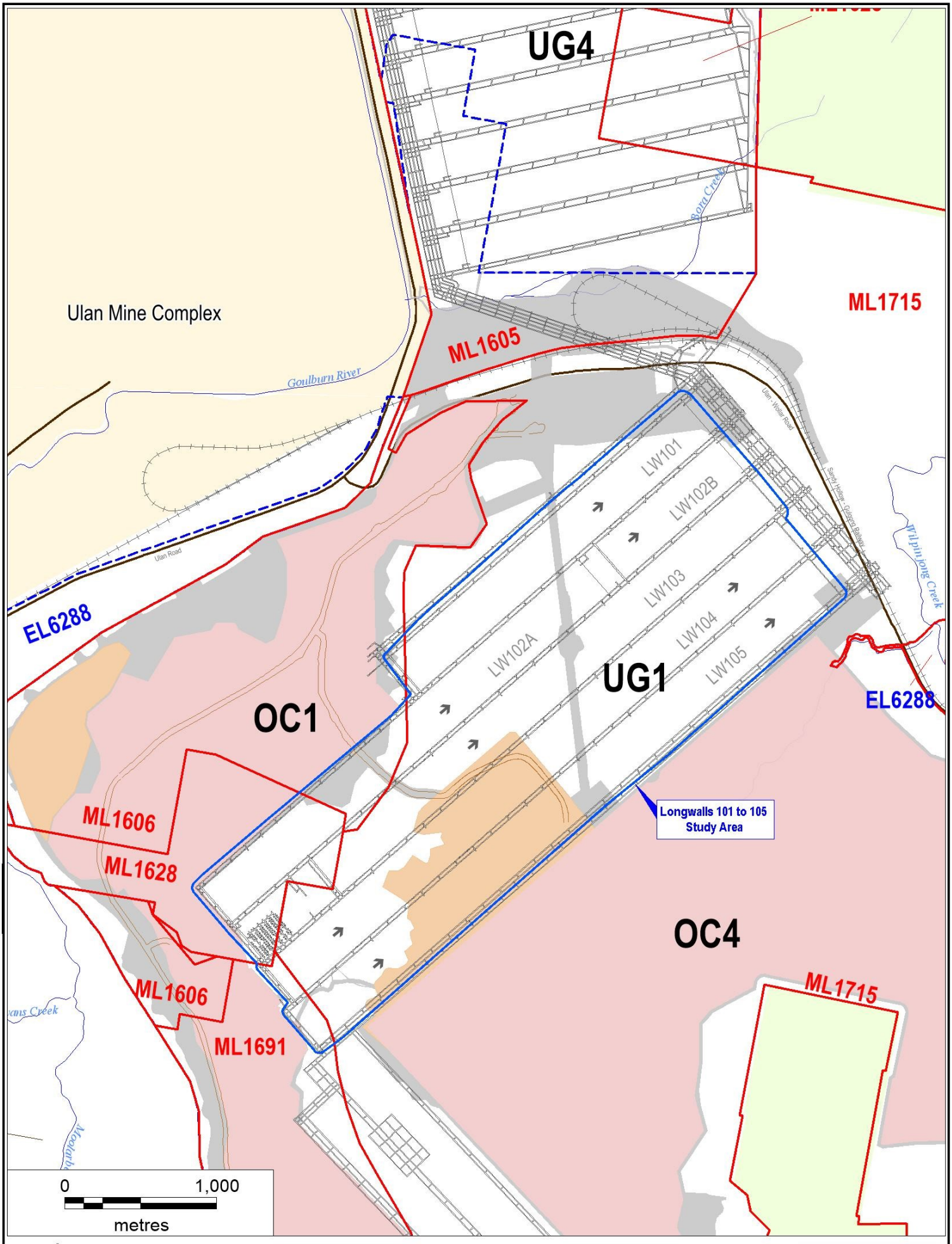
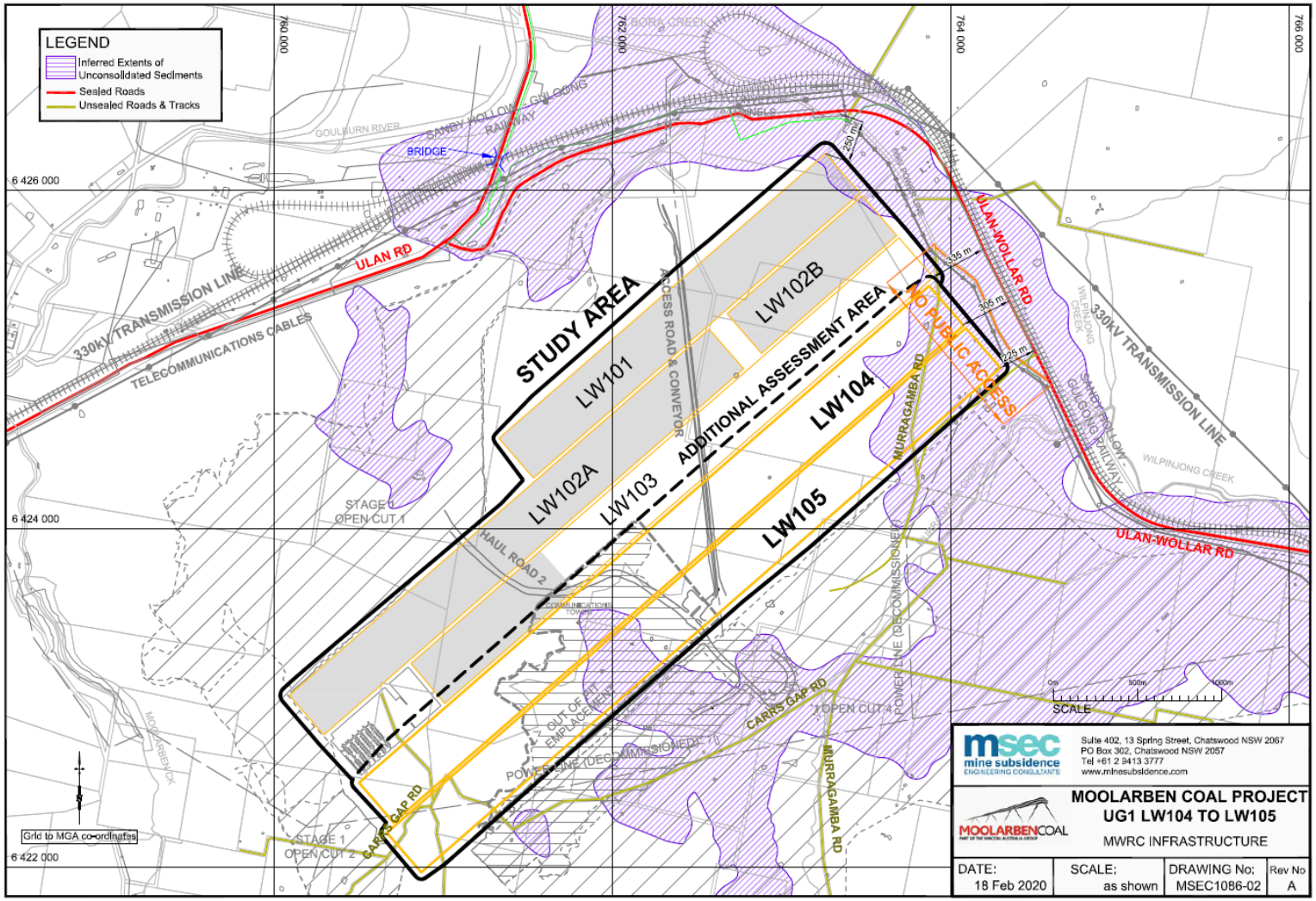


Figure 3
UG1 Longwalls 101-105 Layout



Source; MSEC (2020)

YANCOAL
兖煤澳大利亚有限公司
MOOLARBEN COAL

MWRC Assets

Figure 4

1.2 SUITABLY QUALIFIED AND EXPERIENCED PERSONS

In accordance with Condition 5(a), Schedule 4 of Project Approval (08_0135), the suitably qualified and experienced persons that have prepared this LW101-105 BFMP-MWRC, namely representatives from Mine Subsidence Engineering Consultants (MSEC) and MCO, were endorsed by the Secretary of the Department of Planning, Industry and Environment (DPIE).

This LW101-105 BFMP-MWRC has been prepared in consultation with the Mid-Western Regional Council (MWRC) (Section 4.4).

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

1.3 STRUCTURE OF THE LONGWALLS 101-105 BFMP-MWRC

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

Section 2: Describes the review and update of the LW101-105 BFMP-MWRC.
Section 3: Outlines the statutory requirements applicable to the LW101-105 BFMP-MWRC.
Section 4: Provides baseline data, extraction schedule, revised assessment of the potential subsidence impacts and environmental consequences for Longwalls 101-105, as well as the outcomes of the risk assessment.
Section 5: Details the performance measures relevant to MWRC assets.
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 program to collect sufficient baseline data for future Extraction Plans.
Section 13: Describes the Annual Review, audits, regular reporting and improvement of environmental performance.
Section 14: Outlines the management and reporting of incidents.
Section 15: Outlines the management and reporting of complaints.
Section 16: Outlines the management and reporting of non-compliances with statutory requirements.
Section 17: Lists the references cited in this LW101-105 BFMP-MWRC.

2.0 LONGWALLS 101 TO 105 BFMP-MWRC REVIEW AND UPDATE

In accordance with Condition 5, Schedule 6 of Project Approval (08_0135), this LW101-105 BFMP-MWRC 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 to the conditions of this approval or MP 05_0117 (unless the conditions require otherwise),

the Proponent shall review and, if necessary, revise the strategies, plans, and programs required under this approval to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval

2.1 ACCESS TO INFORMATION

In accordance with Condition 11, Schedule 6 of Project Approval (08_0135), MCO will make the approved LW101-105 BFMP-MWRC publicly available on the MCO website.

3.0 STATUTORY REQUIREMENTS

MCO's statutory obligations are contained in:

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

Obligations relevant to this LW101-105 BFMP-MWRC are described below.

3.1 EP&A ACT PROJECT APPROVAL

Condition 5(g), Schedule 4 of Project Approval (08_0135) requires the preparation of a Built Features Management Plan as a component of the Extraction Plan. In addition, Conditions 3, 5(n), 5(p) and 6, Schedule 4 and Condition 3, Schedule 6 of Project Approval (08_0135) outline general management plan requirements that are applicable to the preparation of this LW101-105 BFMP-MWRC.

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

Table 1: Management Plan Requirements

Project Approval (08_0135) Condition	LW101-105 BFMP-MWRC Section
Condition 3, Schedule 4	
Notes: *...* • *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 5 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.* *...*	Section 8 Sections 5, 6 & 8 Section 9
Condition 5(g), Schedule 4	
(g) include a Built Features Management Plan, which has been prepared in consultation with DRE and the owners of affected public infrastructure, to manage the potential subsidence impacts and/or environmental consequences of the proposed second workings, and which: • *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;*	Section 4.1 Section 4.4 Sections 7 & 9 Section 13.1
Condition 5(n), Schedule 4	
(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; ...	Section 9
Condition 5(p), Schedule 4	
(p) include a program to collect sufficient baseline data for future Extraction Plans.	Section 12
Condition 6, Schedule 4	
6. The Proponent shall ensure that the management plans required under conditions 5(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* *b) a detailed description of the measures that would be implemented to remediate predicted impacts.*	Section 4 & 6.3 Section 7

Table 1 (Continued): Management Plan Requirements

Project Approval (08_0135) Condition	LW101-105 BFMP-MWRC Section
Condition 3, Schedule 6	
3. The Proponent shall ensure that the management plans required under this approval are prepared in accordance with any relevant guidelines, and include:	Sections 3 & 4.4
a) detailed baseline data;	Section 4.1
b) a description of:	
• *the relevant statutory requirements (including any relevant approval, licence or lease conditions);*	Section 3
• *the 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 8
c) a description of the measures that would be implemented to comply with the relevant statutory requirements, limits, or performance measures/criteria;	Sections 7 & 9
d) a program to monitor and report on the:	Sections 6, 8 & 13
• *impacts and environmental performance of the project;*	
• *effectiveness of any management measures (see c above);*	
e) a contingency plan to manage any unpredicted impacts and their consequences;	Section 9
f) a program to investigate and implement ways to improve the environmental performance of the project over time;	Sections 6 & 13
g) a protocol for managing and reporting any:	
• *incidents;*	Section 14
• *complaints;*	Section 15
• *non-compliances with statutory requirements; and*	Section 16
• *exceedances of the impact assessment criteria and/or performance criteria; and*	Section 9
h) a protocol for periodic review of the plan.	Section 2

3.2 OTHER LEGISLATION

The Acts which may be applicable to the conduct of the Moolarben Coal Complex includes, but is not limited to, the:

- *Crown Lands Act, 1989;*
- *Fisheries Management Act, 1994;*
- *Heritage Act, 1977;*
- *Coal Mine Subsidence Compensation Act, 2017;*
- *Mining Act, 1992;*
- *National Parks and Wildlife Act, 1974;*

- *Biodiversity Conservation Act, 2016;*
- *Protection of the Environment Operations Act, 1997;*
- *Roads Act, 1993;*
- *Water Act, 1912;*
- *Water Management Act, 2000;*
- *Work Health and Safety Act, 2011;* and
- *Work Health and Safety (Mines and Petroleum Sites) Act, 2013.*

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

4.0 MID-WESTERN REGIONAL COUNCIL INFRASTRUCTURE

4.1 BASELINE DATA

MWRC infrastructure in the vicinity of Longwalls 101 to 105 includes (Figure 4):

- Ulan Road;
- Ulan Road bridge (over the Sandy Hollow Gulgong Railway);
- publicly accessible sections of Ulan-Wollar Road (on land owned by MWRC and on land owned by MCO);
- publicly inaccessible (i.e. closed) sections of Ulan-Wollar Road (on land owned by MWRC); and
- other roads closed to the public (on land owned by MWRC) including Murragamba Road and Carrs Gap Road.

The MWRC also owns infrastructure associated with these roads, such as the road pavement, embankments, tunnels and culverts.

Ulan-Wollar Road runs adjacent to the Sandy Hollow Gulgong Railway at distances of 225 metres (m) or more from Longwalls 101-105 (Figure 4). The route of Ulan-Wollar Road from the intersection with Ulan Road and around the northern end of Longwalls 101-105 has recently been realigned. The former road alignment (located closer to the northern ends of Longwalls 101-105) has been closed to the public at both ends.
Ulan Road is located to the north west of Longwalls 101 to 105, more than 1 km from the nearest longwall with an open cut pit between the road and the longwalls. A road bridge is located along Ulan Road, over the Sandy Hollow Gulgong Railway line, and is 1.2 km from Longwall 101.

The nearest publicly accessible sections of Ulan-Wollar Road to the proposed longwalls are approximately 250 m from Longwall 101 and 225 m from Longwall 105. The nearest closed sections of Ulan-Wollar Road are approximately 100 m from Longwall 103. Additionally, sections of the other closed roads, Murragamba Road and Carrs Gap Road, directly overly Longwalls 101 to 105. As these roads are closed to the public, they have not been considered further.

The nearest drainage culvert on Ulan-Wollar Road is located approximately 550 m to the south east at Murragamba Creek. An embankment and twin tunnels have also been constructed beneath the road along the alignment of the conveyor, approximately 720 m from Longwall 101.

4.2 LONGWALLS 101-105 EXTRACTION SCHEDULE

Ulan-Wollar Road is located to the north and north-east of the Study Area for Longwalls 101-105 (Figure 4) and will not be subject to measurable conventional subsidence effects, however, may experience small far-field horizontal movements.

Longwalls 101-105 and the area of land within the furthest extent of the 26.5° angle of draw and 20 mm predicted subsidence contour (i.e. the Longwalls 101-103 Study Area) are shown on Figures 3 and 4. Longwall extraction will occur from the west to the east. The longwall layout includes approximately 311 m panel widths (void) with 20 m pillars (solid).

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

Table 2: Provisional Extraction Schedule

Longwall	Estimated Start Date	Estimated Duration	Estimated Completion Date
101	-	-	Complete
102 (A+B)	-	-	Complete
103	-	9 months	June2020
103 Plunge	-	-	Complete
104	July 2020	12 months	June 2021
105	July 2021	11 months	May 2022

Following approval of the UG1 Optimisation Modification in April 2016, MCO has delineated geological features in Longwall 102 and 103 that prevented economic mining of these sections, and has subsequently revised the longwall layout to avoid these features. The subsequent barrier pillar separating Longwalls 102A and 102B is approximately 140 m in length and the LW103 commencing end was shortened by 660m and replaced by a first workings only production panel. LW104 was also shortened by 70m at the commencing end to allow for a rear of panel shaft. In addition, following further detailed design, Longwalls 101-103 have been shortened by approximately 70 m to provide safe operational conveyor distance between the end of the longwalls and main headings. With the exception of these changes, the longwall geometry is the same as that for the approved UG1 Optimisation Modification, and MSEC (2017a and 2020) concludes that the overall impact assessments for the natural and built features are unchanged or reduced.

4.3 REVISED SUBSIDENCE AND IMPACT PREDICTIONS

Subsidence and impact predictions for Longwalls 101-105 in relation to the MWRC assets was conducted by MSEC (2015) as part of the Moolarben Coal Complex UG1 Optimisation Modification Environmental Assessment (EA).

Revised subsidence and impact predictions specifically for the extraction of Longwalls 101-105 on MWRC assets were conducted by MSEC and reported in MSEC (2020). Subsequent to the preparation of MSEC (2017b), the longwall layout was revised to incorporate a reduced longwall length and shorter barrier pillar (Section 4.2). MSEC (2017a) includes updated subsidence predictions for the revised layout. As the asset is located further from Longwalls 101-103, a reduced impact is predicted by MSEC (2017a) compared to MSEC (2017b).

In relation to subsidence predictions for Longwalls 101-105, MSEC (2017a; 2017b, 2020) make the following conclusions:

- The predicted levels of conventional vertical mine subsidence along the publicly accessible section of Ulan-Wollar Road are likely to be negligible, however the road may be subject to low level far field horizontal movements less than 80 mm.
- The effects of the predicted subsidence and the differential far field movements due to the proposed extraction of the UG1 longwalls on the Ulan-Wollar Road are unlikely to adversely impact on the road.
- However, Ulan-Wollar Road should be inspected on a regular basis as the Longwalls 101-105 are mined, to confirm that the observed ground movements and impacts are consistent with the predictions and assessments. In this way, the road can be maintained in a safe and serviceable condition throughout the mining period.

It is expected that any subsidence impacts affecting the serviceability of Ulan-Wollar Road could be managed using typical mitigation and management techniques (Section 7).

4.4 RISK ASSESSMENT

At a meeting on 16 February 2017, MCO presented to representatives of the MWRC the predicted subsidence impacts and proposed monitoring programs, controls and contingencies relating to MWRC infrastructure within the vicinity of the Study Area. The MWRC was satisfied that a formal risk assessment workshop was not required for the LW101-105 BFMP-MWRC. Notwithstanding, the MWRC would review the LW101-105 BFMP-MWRC documentation when provided. Given predicted subsidence impacts remain unchanged for Longwall 104-105 the same process is to be undertaken for these longwall panels.

In accordance with the draft *Guidelines for the Preparation of Extraction Plans* (DP&E and DRE, 2015), risk control measures and procedures have been identified which consider the extraction of coal beneath the land within the Study Area and in proximity to the MWRC assets, and are summarised as follows:

Baseline Data / Validation

1. Carry out a visual inspection of the Ulan-Wollar Road (and associated infrastructure) within 400 m of Longwalls 101 to 105.
2. Provide MWRC with a copy of the visual inspection of the Ulan-Wollar Road (and associated infrastructure) once carried out, and obtain other available baseline records (where available).
3. Installation of the subsidence monitoring program.

Management / Monitoring / Response Measures

4. Establish a key contacts list between MCO and MWRC to provide a regular update of status of mining activities, and for ongoing liaison.
5. Include in the LW101-105 BFMP-MWRC a schedule of times/frequency of communication with MWRC for the status of mining of Longwalls 101-105.
6. Develop a TARP and include triggers for conditions that may need to be actioned by MCO and/or MWRC.
7. Include a monitoring plan in the LW101-105 BFMP-MWRC to implement visual inspections of the roadway, pipes/culverts and other furniture during active subsidence associated with Longwalls 101-105.

The proposed risk control measures and procedures have been incorporated where relevant in this LW101-105 BFMP-MWRC and the program for implementation is summarised in Table 3.

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

	Risk Control Measure / Procedure	LW101-105 BFMP-MWRC Section	Proposed Timing
Baseline Data / Validation			
1	Carry out a visual inspection of the Ulan-Wollar Road (and associated infrastructure) within 400 m of Longwalls 101 to 105.	Section 6.2	Prior to Longwall 104 being within 400m
2	Provide MWRC with a copy of the visual inspection of the Ulan-Wollar Road (and associated infrastructure) once carried out, and obtain other available baseline records (where available).	Section 6.2	Prior to Longwall 104, subject to availability
3	Extension of the subsidence monitoring program for Longwalls 104 and 105.	Section 6	Prior to Longwall 104
Management / Monitoring / Response Measures			
4	Establish key contacts list in the LW101-105 BFMP-MWRC.	Section 11.1	Complete
5	Include a schedule of times/frequency of communication with MWRC for the status of mining of Longwalls 101-105 in the LW101-105 BFMP-MWRC.	Section 7 and Table 6	Complete

	Risk Control Measure / Procedure	LW101-105 BFMP-MWRC Section	Proposed Timing
Baseline Data / Validation			
6	Include in the TARP triggers for conditions that may need to be actioned by MCO and/or MWRC.	Section 10 and Attachment 1	Complete
7	Include a monitoring plan in the LW101-105 BFMP-MWRC to implement visual inspections of the roadway, pipes/culverts and other furniture during active subsidence associated with Longwalls 101-105.	Table 5	Complete

MCO considers all risk control measures and procedures to be feasible to manage all identified risks relating to public safety and predicted impacts to MWRC infrastructure.

5.0 PERFORMANCE MEASURES

The performance measures specified in Table 19, Schedule 4 of Project Approval (08_0135) relevant to the Ulan-Wollar Road, as a built feature, are listed in Table 4.

Table 4: Built Features Subsidence Impact Performance Measures

Feature	Subsidence Impact Performance Measure
Key public infrastructure:	
Ulan-Wollar Road	Always safe and serviceable. Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.
Other infrastructure:	
Murragamba Road[1]	Always safe. Serviceability should be maintained wherever practicable. Loss of serviceability must be fully compensated. Damage must be fully repairable, and must be fully repaired or else replaced or fully compensated.

Source: Table 19 of Condition 3, Schedule 4 of Project Approval (08_0135).

[1] Murragamba Road is closed to the public, and as such, has not been considered further.

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

Section 6 outlines the monitoring that will be undertaken to assess the impact of Longwalls 101-105 against the performance measures in relation to the Ulan-Wollar Road. Management measures for the Ulan-Wollar Road are outlined in Section 7 and performance indicators for the performance measures are summarised in Section 8.

6.0 MONITORING

A monitoring program will be developed in order to monitor the impacts of the extraction of Longwalls 101-105 on the Ulan-Wollar 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: Ulan-Wollar Road Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Pre-mining			
Ulan-Wollar Road – Visual inspection.	Condition of road pavements, culverts and other furniture.	Prior to commencement of Longwall 104 extraction.	Underground Technical Manager and representative of asset owner if required
UG1 subsidence monitoring lines as described in the UG1 Longwalls 101 to 105 Subsidence Monitoring Program (LW101-105 SMP).	Ground survey of 'FF Line' (along alignment of Ulan-Wollar Road) – baseline.	Prior to commencement of Longwall 101 extraction and extend prior Longwall 104 extraction.	Underground Technical Manager / Registered Mine Surveyor
During and After Mining			
UG1 subsidence monitoring lines as described in the LW101-105 SMP.	Ground survey of 'FF Line' (along alignment of Ulan-Wollar Road). Monitoring parameters include: • subsidence; • tilt; • tensile strain; • compressive strain; and • absolute horizontal translation.	Prior to secondary extraction within 400 m of the longwall take-off positions. At 100 m intervals determined by the longwall chainage marks while the active mining face is within 400 m of the longwall take-off positions. *[Inspection sheets provided to MWRC unless otherwise agreed]* At any time in case of an emergency and requested by MWRC.	Underground Technical Manager / Registered Mine Surveyor
Ulan-Wollar Road – Subsidence impact inspection.	Subsidence impact inspections will target the identification of: • impacts to the surface including cracks, buckling and stepping; • impacts to the visible surfaces of pipes/culverts including cracking, buckling, shearing, and collapse; and • visible impacts to furniture.	If/when ground movement (in excess of survey accuracy) is detected during monitoring of the FF Line. Opportunistic visual observations during routine works by MCO and its contractors. At any time in case of an emergency and requested by MWRC.	Underground Technical Manager
	As per MWRC inspections.	Routinely as per MWRC inspections.	MWRC

Table 5 (Continued): Ulan-Wollar Road Monitoring Program Overview

Monitoring Component	Parameter	Timing/Frequency	Responsibility
Post-Mining			
UG1 subsidence monitoring lines as described in the LW101-105 SMP.	Ground survey of 'FF Line' (along alignment of Ulan-Wollar Road). Monitoring parameters include: • subsidence; • tilt; • tensile strain; • compressive strain; and • absolute horizontal translation.	Within three months following completion of longwall recovery from each of Longwall.	Underground Technical Manager / Registered Mine Surveyor
Ulan-Wollar Road – Visual inspection.	Condition of road pavements, culverts and other furniture post-mining.	Following completion of active mining at UG1.	Underground Technical Manager and representative of asset owner if required

The frequency of monitoring will be reviewed either:

- in accordance with the Annual Review; or
- if triggered as a component of the Contingency Plan as outlined in Section 9 of this LW101-105 BFMP-MWRC.

6.1 SUBSIDENCE PARAMETERS

Subsidence parameters (i.e. subsidence, tilt, tensile strain, compressive strain and absolute horizontal translation) associated with mining will be measured in accordance with the LW101-105 SMP.

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

Monitoring of subsidence parameters specific to Ulan-Wollar Road will be measured by a single survey line ('FF Line') located along the alignment of Ulan-Wollar Road in the vicinity of Longwalls 101-105. Surveys along the FF Line will be undertaken prior to extraction of Longwall 101 and 104, and prior to mining within 400 m of the longwall take-off positions and at 100 m intervals based on longwall chainage marks when mining is within 400 m of the longwall take-off positions. Surveys will also be conducted within three months of the completion of longwall recovery.

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

6.2 SUBSIDENCE IMPACTS

A visual inspection of Ulan-Wollar Road will be conducted prior to commencement of Longwall 101 and 104 to establish the condition of the roadway and pipes/culverts.

The visual inspection will be conducted by MCO and include:

- recording of existing defects using detailed road surface photography (video), i.e. one photograph every 2 m; and
- recording of existing pipe/culvert condition.

A copy of the visual inspection report will be provided to MWRC. Other road pavement baseline records (where available) would be provided to MCO.

In the event monitoring identifies ground movement (in excess of survey accuracy) MCO will undertake an inspection of the road for any impacts caused by subsidence movements. Opportunistic observations of subsidence impacts will be conducted during routine works by MCO (and its contractors) and MWRC's routine road condition inspections.

Information will be recorded in the LW101-105 BFMP-MWRC Subsidence Impact Register (Attachment 2) and reported in accordance with Project Approval (08_0135) (Section 13).

6.3 ENVIRONMENTAL CONSEQUENCES

MCO and MWRC will compare the results of the subsidence impact monitoring against the built features performance measure and indicators (Sections 5 and 8). In the event the observed subsidence impacts from the Moolarben Coal Complex exceed the performance measure or indicators, MCO and MWRC will assess the consequences of the exceedance in accordance with the Contingency Plan described in Section 9.

7.0 MANAGEMENT MEASURES

The potential management measures in relation to the Ulan-Wollar Road pavement include:

- mill and/or replace pavement layers; and
- crack sealing/repair.

In the event that repairs are required, traffic control measures such as contra-flow of traffic or partial carriageway closures may be used to divert traffic off one carriageway, lane or shoulder. Repairs would be carried out as soon as practicable in consultation with the MWRC.

The potential management measures in relation to drainage structures (pipes/culverts) include:

- point repairs;
- replace sections of pipe/culvert; and
- grouting/sealing of cracks.

The potential management measures in relation to guard rails, marker posts and signage include repairs and/or replacement of furniture.

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 will be reported in the Annual Review.

Key management actions and timing is summarised in Table 6.

Table 6: Ulan-Wollar Road Key Management Actions

Management Measure	Timing/Frequency	Responsibility
Pre-mining		
Notification to MWRC prior to commencement of secondary extraction.	Prior to secondary extraction of Longwall 101 and 104.	Underground Technical Manager
Visual inspection and record of Ulan-Wollar Road pavement, including culverts and other furniture.	Prior to secondary extraction of Longwall 101 and 104.	Underground Technical Manager
During Mining		
Notification to MWRC prior to subsidence effects on Ulan-Wollar Road.	Prior to mining within 400 m of the longwall take-off positions.	Underground Technical Manager
Provision of **inspection sheets** detailing the outcome of the subsidence impact monitoring program to MWRC (unless otherwise agreed with MWRC).	During Longwall 101-105 extraction.	Underground Technical Manager
Implement TARP (Attachment 1).	During Longwall 101-105 extraction.	Underground Technical Manager
Post-mining		
Visual Inspection of Ulan-Wollar Road to identify any post-mining remediation works required.	Following completion of active mining at UG1.	Underground Technical Manager

8.0 ASSESSMENT OF PERFORMANCE INDICATORS AND MEASURES

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

The performance indicators proposed to ensure that the performance measures for Ulan-Wollar Road are achieved include:

- no additional visible pavement cracking or other defects of the road pavement (when compared against baseline conditions and sections of road outside the Study Area) resulting in deterioration of road quality;
- no ponding of water on the road surface as a result of changes in grade from subsidence associated with Longwalls 101-105;
- no joint displacement or cracking or other defects of the drainage structure (e.g. pipes/culverts) in excess of 5 mm; and
- serviceability of guard rails, marker posts and signage is maintained.

Monitoring conducted to inform the assessment of secondary extraction of Longwalls 101-105 against the performance indicators (for the performance measures relevant to the Ulan-Wollar 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 UG1, and review of FF Line monitoring data to confirm if ground movements in excess of survey accuracy have occurred.

If a performance measure is considered to have been exceeded, the Contingency Plan outlined in Section 9 of this LW101-105 BFMP-MWRC will be implemented.

9.0 CONTINGENCY PLAN

In the event the performance measures relevant to the Ulan-Wollar 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 Manager or the Environmental and Community Manager within 24 hours.
- The observation will be recorded in the Subsidence Impact Register (Attachment 2).
- 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. DPIE, DRE and MWRC).
- 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, MWRC and DRE.
- This LW101-105 BFMP-MWRC and the performance indicators will be reviewed to adequately manage future potential impacts within the limits of Project Approval (08_0135).

MCO will comply with the NSW *Coal Mine Subsidence Compensation Act, 2017* (formerly *Mine Subsidence Compensation Act, 1961)* in the event that property damages occur as a result of mining Longwalls 101-105.

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 Ulan-Wollar Road is exceeded are summarised in Table 7.

Temporary road closure procedures if required would be developed and carried out in consultation with the MWRC.

Table 7: Potential Contingency Measures

Environmental Consequence	Potential Contingency Measures	
	Measure	Description
Impact on:		
Pavement	Repair road.	Temporary closure of the road and repair of pavement.
Pipes/Culverts	Repair or replace pipe. Repair or rebuild culvert.	Construction of temporary drainage pipe/culvert (if required) and repair or replacement of original pipe/culvert.
Other Furniture (Guard Rail, Marker Posts, Signage)	Repair or replace furniture.	Repair/replace section of guard rail, marker post or signage.

10.0 TRIGGER ACTION RESPONSE PLAN – MANAGEMENT TOOL

The framework for the various components of this LW101-105 BFMP-MWRC are summarised in the TARP shown in Attachment 1. 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.

11.0 ROLES AND RESPONSIBILITIES

Key responsibilities of MCO personnel in relation to this LW101-105 BFMP-MWRC are summarised in Table 8. Responsibilities may be delegated as required.

Table 8: Longwalls 101 to 105 Built Features Management Plan – Mid-Western Regional Council Responsibility Summary

Responsibility	Task
General Manager	• Ensure resources are available to MCO personnel to facilitate the completion of responsibilities under this LW01-105 BFMP-MWRC.
Underground Technical Manager	• Ensure the LW101-105 SMP is implemented. • Ensure monitoring required under this LW101-105 BFMP-MWRC 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.
Environmental and Community Manager	• Liaise with relevant stakeholders regarding subsidence impact management and related environmental consequences.
Registered Mine Surveyor	• Undertake all subsidence monitoring to the required standard within the specified timeframes and ensure data are adequately checked, processed and recorded.

11.1 KEY CONTACTS

The details of key contacts and phone numbers in relation to this LW101-105 BFMP-MWRC are summarised in Table 9.

Table 9: Longwalls 101 to 105 Built Features Management Plan – Mid-Western Regional Council Key Personnel Contact Details

Organisation	Position	Contact Name	Phone Number
MCO	Underground Technical Manager	Mr Liam Mildon	02 6376 1614
	Environmental and Community Manager	Mr Graham Chase	02 6376 1407
	Moolarben Coal Hotline		1800 556 484
MWRC	General Manager	Brad Cam	02 6378 2850
	Manager Works	Andrew Kearins	02 6378 2920 or 0428 725 802

12.0 FUTURE EXTRACTION PLANS

In accordance with Condition 5(p), Schedule 4 of Project Approval (08_0135), MCO will collect baseline data for the future Extraction Plan (e.g. for the next Underground Mine). However, for the Ulan-Wollar Road, the baseline (and post-mining) data collected for Longwalls 101-103 will be used as baseline for Longwalls 104-105 as longwall mining progressively moves further south of the MWRC assets.

In addition to the baseline data collection, consideration of the environmental performance and management measures, in accordance with the review(s) conducted as part of this LW101-105 BFMP-MWRC, will inform the appropriate type and frequency of monitoring of the assets relevant to the next Extraction Plan.

13.0 ANNUAL REVIEW, REGULAR REPORTING AND IMPROVEMENT OF ENVIRONMENTAL PERFORMANCE

In accordance with Condition 4, Schedule 6 of Project Approval (08_0135), MCO will conduct an Annual Review of the environmental performance of the Project by the end of March each year, or as otherwise agreed by the Secretary of the DPIE.

The Annual Review will:

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

In accordance with Condition 11, Schedule 6 of Project Approval (08_0135), the Annual Review will be made available on the MCO website.

As described in Section 2, this LW101-105 BFMP-MWRC will be reviewed within three months of the submission of an Annual Review, and revised where appropriate.

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

13.1 AUDITS

In accordance with Condition 9, Schedule 6 of Project Approval (08_0135), an independent environmental audit was conducted by the end of December 2015 and again in 2018, and will be undertaken every three years thereafter. A copy of the independent environmental audit will be provided to the Secretary of the DPIE and made available on the MCO website.

The independent environmental audit will be conducted by suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary of the DPIE.

The independent environmental audit will assess the environmental performance of the Project and assess whether it is complying with the requirements of Project Approval (08_0135), and any other relevant approvals, and recommend measures or actions to improve the environmental performance of the Project.

Further to the above, audits to ISO 31000 Risk Management standard are conducted on elements of the Moolarben UG Safety Management System annually, with internal and external audits being undertaken on alternate years. Additionally, an annual auditing of compliance and effectiveness on built features is captured as part of the Annual Review process.

14.0 INCIDENTS

An incident is defined in Project Approval (08_0135) as a set of circumstances that:

- causes or threatens to cause material harm to the environment; and/or
- breaches or exceeds the limits or performance measures/criteria in Project Approval (08_0135).

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

The reporting of incidents will be conducted in accordance with Condition 7, Schedule 6 of Project Approval (08_0135).

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

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

15.0 COMPLAINTS

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

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

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

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

In accordance with Condition 11, Schedule 6 of Project Approval (08_0135), the complaints register will be updated monthly and made available on the MCO website.

16.0 NON-COMPLIANCES WITH STATUTORY REQUIREMENTS

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

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

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

As described in Section 14, MCO will notify the Secretary of the DPIE, and any other relevant agencies, of any incident associated with MCO.

A review of MCO's compliance with all conditions of Project Approval (08_0135), mining leases and all other approvals and licenses will be undertaken prior to (and included within) each Annual Review. The Annual Review will be made publicly available on the MCO website.

As described in Section 13.1, an independent environmental audit was conducted by the end of December 2015 and again in 2018, and will be undertaken every three years thereafter. A copy of the audit report will be submitted to the Secretary of the DPIE and made publicly available on the MCO website.

17.0 REFERENCES

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

Mine Subsidence Engineering Consultants (2015) *Moolarben Coal Complex: Revised Predictions of Subsidence Parameters and Revised Assessments of Subsidence Impacts resulting from the Proposed UG1 Mine Layout Optimisation Modification*.

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

Mine Subsidence Engineering Consultants (2017b) *Moolarben Coal Operations: Longwalls 101 to 103 - Subsidence Predictions and Impact Assessments for the Mid-Western Regional Council Infrastructure.*

Mine Subsidence Engineering Consultants (2020) Moolarben Project Stage 2- *Longwalls 104 to 105 Subsidence Predictions and Impacts Assessments for the Natural and Built Features In Support of the Extraction Plan*

ATTACHMENT 1

UG1 LONGWALLS 101 TO 105
BUILT FEATURES MANAGEMENT PLAN – MID-WESTERN REGIONAL COUNCIL
TRIGGER ACTION RESPONSE PLAN

Condition	Normal		Level 1	Level 2
	Baseline Conditions	**Predicted Impacts**	**Implement Management Measures**	**Restoration/Contingency Phase**
Trigger	Ulan-Wollar Road and associated infrastructure is safe, serviceable and repairable or as otherwise identified by pre-mining inspection.	Subsidence effects on Ulan-Wollar Road.	Monitoring identifies impacts that are greater than predicted, but the performance measure has not been exceeded and is not likely to be exceeded.	If the Performance Measure relevant to Ulan-Wollar Road has been exceeded, or is likely to be exceeded (i.e. unsafe or loss of serviceability).
Action	Establish baseline data, including: • Pre-mining visual inspection. • Pre-extraction subsidence survey as per the UG1 Longwalls 101 to 105 Subsidence Monitoring Program.	Conduct monitoring as described in **Section 6**, including: • Ground survey. • Subsidence impact inspections, targeting the identification of: – impacts to the surface including cracks, buckling and stepping; – impacts to the visible surfaces of pipes/culverts including cracking, buckling, shearing and collapse; and – visible impacts to furniture. • Visual inspection of the condition of road pavements, culverts and other furniture.	Management measures implemented as described in **Section 7** (with regard to the specific circumstances of the subsidence impact [e.g. the nature and extent of the impact]). Follow-up inspections will be conducted to assess the effectiveness of the management measures implemented and the requirement for any additional management measures.	Contingency Plan implemented (with regard to the specific circumstances of the subsidence impact). In summary: • The observation will be reported to the Underground Technical Manager or the Environmental and Community Manager within 24 hours. • The observation will be recorded in the Subsidence Impact Register. • The exceedance or likely exceedance will be reported in an incident report. • An investigation will be conducted to identify and evaluate contributing factors to the exceedance. • An appropriate course of action will be developed in consultation with relevant stakeholders and government agencies. • The course of action will be approved by, and implemented to the satisfaction of, relevant stakeholders and government agencies. • The Built Features Management Plan – Mid-Western Regional Council and the performance indicators will be reviewed to adequately manage future potential impacts.
Frequency	Prior to commencement of extraction of Longwall 101 and 104.	• Ground survey: – Prior to secondary extraction within 400 m of the longwall take-off positions. – At 100 m intervals (determined by the longwall chainage marks) while the active mining face is within 400 m of the longwall take-off positions. – Within three months of longwall completion (e.g. longwall has been relocated from the final end of block mining position). – At any time in case of fault or emergency and where requested by the Mid-Western Regional Council (MWRC). • Subsidence impact inspection: – If/when ground movement (in excess of survey accuracy) is detected during monitoring of the FF Line. – At any time in case of fault or emergency and where requested by MWRC. – Routinely as per MWRC inspections. • Visual inspection: – Following completion of active mining at UG1.	To be implemented as required (i.e. if monitoring identifies impacts that are greater than predicted, but the performance measure has not been exceeded and is not likely to be exceeded).	To be implemented following identification of an exceedance of the performance measure, or if the performance measure is likely to be exceeded (i.e. unsafe or loss of serviceability).
Position of Decision Making	• Underground Technical Manager. • MWRC – General Manager (or delegate).	• Underground Technical Manager. • MWRC – General Manager (or delegate).	• Underground Technical Manager. • MWRC – General Manager (or delegate).	• Underground Technical Manager. • MWRC – General Manager (or delegate).

ATTACHMENT 2

UG1 LONGWALLS 101 TO 105
BUILT FEATURES MANAGEMENT PLAN – MID-WESTERN REGIONAL COUNCIL
SUBSIDENCE IMPACT REGISTER

UG1 Longwalls 101 to 105 Built Features Management Plan – Mid-Western Regional Council
Subsidence Impact Register

Impact Register Number	Built Feature	Impact Description	Does Impact Exceed the Built Feature Performance Measure/Indicators? (Yes/No)	Management Measures Implemented	Were Management Measures Effective? (Yes/No)