



# Moolarben Coal Complex UG1 Optimisation Modification

## Environmental Assessment

### EXECUTIVE SUMMARY



## EXECUTIVE SUMMARY

### ES1 BACKGROUND

The Moolarben Coal Complex is located approximately 40 kilometres north of Mudgee in the Western Coalfields of New South Wales (NSW) (Figure ES-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, Sojitz Moolarben Resources Pty Ltd and a consortium of Korean power companies). MCO and Moolarben Coal Mines Pty Ltd are wholly owned subsidiaries of Yancoal Australia Limited.

The Moolarben Coal Complex comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG1, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities).

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).

Environmental management and monitoring at the Moolarben Coal Complex is conducted in accordance with a range of management plans required in accordance with Project Approvals (05\_0117) and (08\_0135).

### ES2 MODIFICATION OVERVIEW

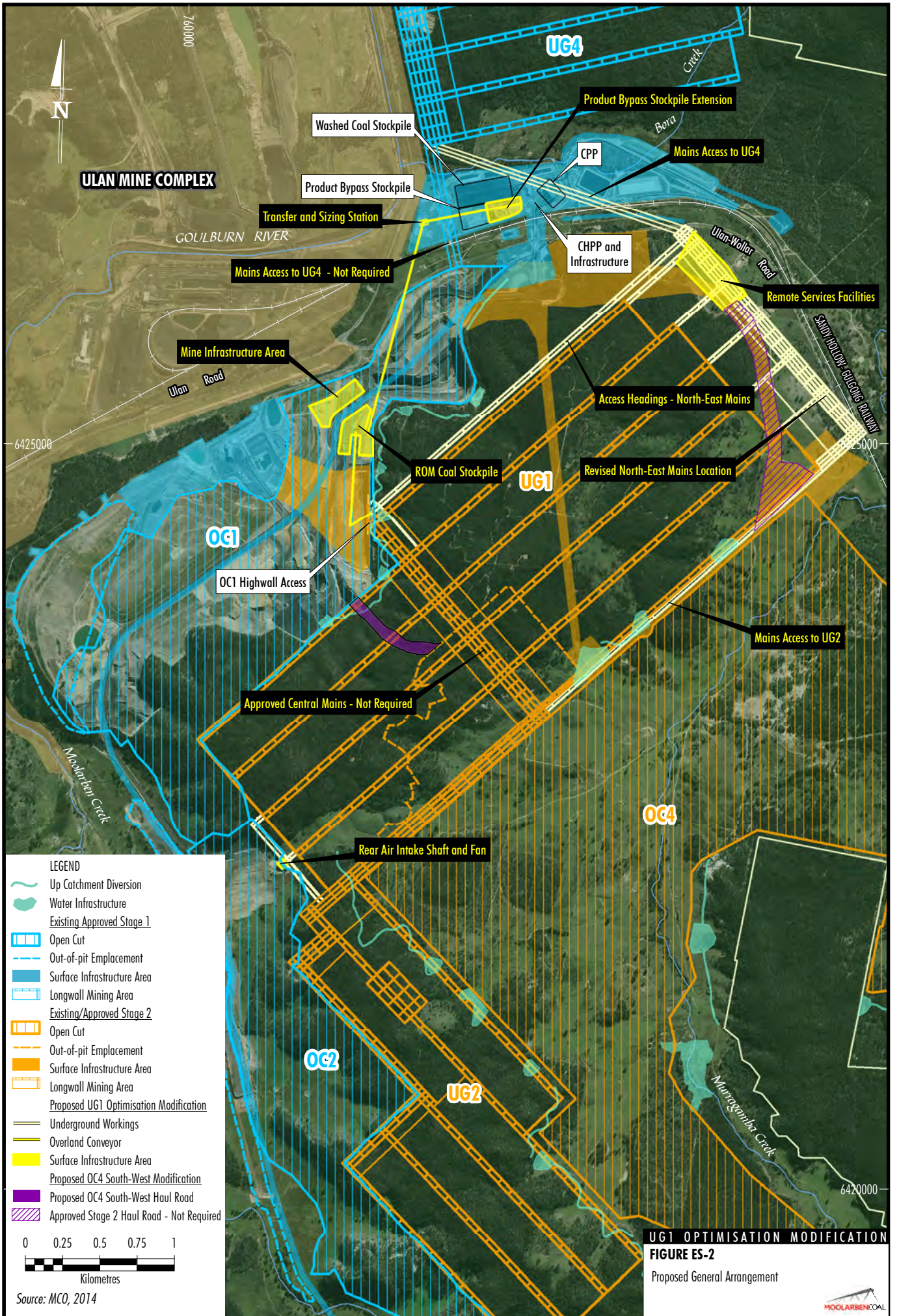
This Environmental Assessment has been prepared by MCO to support a request to modify Project Approvals (05\_0117) and (08\_0135) under section 75W of the NSW *Environmental Planning and Assessment Act, 1979* (the UG1 Optimisation Modification).

Following a review of mine planning, MCO has identified opportunities to extract additional economically viable coal and improve mining and processing efficiencies associated with the underground operations at the Moolarben Coal Complex, namely UG1.

As such, the UG1 Optimisation Modification proposes the following (Figure ES-2):

- recovery of approximately 3.7 million tonnes of additional run-of-mine (ROM) coal over the life of the mine;
- an extension of UG1 longwall panels in the north-east by approximately 150 to 500 metres (m);
- an extension of two UG1 longwall panels in the south-west by approximately 75 m;
- relocation of the approved UG1 central main headings to the north-east;
- relocation of underground access to UG2 and UG4;
- longwall extraction of the portion of coal that forms the approved (central) main headings;
- an increase in the coal seam extraction height by approximately 300 millimetres to a maximum extraction thickness of 3.5 m;
- an increase to longwall panel void width from approximately 305 to 311 m;
- construction of a ROM coal conveyor (including crushing and screening station and transfer points) between the UG1 pit top facilities in OC1 and the coal handling and preparation plant to transport underground ROM coal;
- extension to the underground product coal stockpile in the coal handling and preparation plant area and relocation and expansion of the underground ROM coal stockpile at the UG1 pit top facilities;
- an increase in the maximum underground ROM coal production rate up to 8 million tonnes per annum (Mtpa) from UG1, UG2 and UG4 (combined);
- an increase in the maximum total site ROM coal rate to 21 Mtpa (i.e. 13 Mtpa from open cut operations and 8 Mtpa from underground operations);
- an increase in average daily rail departures from five to seven and increase in peak daily rail departures to nine;
- construction of Remote Services Facilities (including facilities and services necessary for the operation of an underground mine) and rear air intake shaft and associated fans above the extended UG1 longwall panels; and
- relocation of the underground Mine Infrastructure Area and site administration offices.





The UG1 Optimisation Modification also seeks an increase in the approved Moolarben Coal Complex construction and operational workforces to incorporate anticipated personnel for the approved underground and open cut operations.

The UG1 Optimisation Modification seeks to increase the peak construction workforce to 250 personnel for the Moolarben Coal Complex, with the peak expected to occur for a short period (2 months) during 2017.

An increase in the approved operational workforce for the Moolarben Coal Complex is sought from approximately 439 personnel to approximately 667 personnel on average. A peak operational workforce of 740 personnel would be required for 12 to 18 months during 2016 and 2017.

Other components of the approved Moolarben Coal Complex would **not change** as a result of the UG1 Optimisation Modification, including:

- operational mine life;
- hours of operation;
- blasting limits;
- Biodiversity Offset Strategy;
- site access; or
- open cut coal extraction limits.

### ES3 ENVIRONMENTAL REVIEW

To assess the potential environmental impacts of the UG1 Optimisation Modification, a number of environmental reviews were completed with supporting specialist reports including:

- Subsidence Assessment (prepared by Mine Subsidence Engineering Consultants);
- Groundwater Assessment (prepared by Dundon Consulting with supporting groundwater modelling undertaken by HydroSimulations);
- Noise Assessment (prepared by SLR Consulting);
- Air Quality Assessment (prepared by Todoroski Air Sciences);
- Flora and Fauna Impact Assessment (prepared by EcoLogical Australia);
- Surface Water Assessment Review (prepared by WRM Water & Environment);

- Aboriginal Cultural Heritage Assessment (prepared by Niche Environment & Heritage);
- Road Transport Assessment (prepared by GTA Consultants); and
- Community Infrastructure Assessment (prepared by Coffey Environments Australia Pty Ltd).

A summary of the key findings of these environmental reviews and key commitments with respect to managing potential impacts is provided in Table ES-1.

### ES4 JUSTIFICATION OF THE MODIFICATION

The UG1 Optimisation Modification would allow the recovery of approximately an additional 3.7 million tonnes of underground coal.

The UG1 Optimisation Modification would reduce the number of longwall mining equipment relocations from nine to five which would enable more efficient recovery of underground coal.

The proposed UG1 Optimisation Modification would improve the efficiency of integration of mining operations across the complex, access to the UG1 resource and transfer of underground coal to the Coal Handling and Preparation Plant area.

The UG1 Optimisation Modification is generally consistent with the subsidence impact performance measures in Project Approval (08\_0135). In addition, the environmental review demonstrated that the UG1 Optimisation Modification can be conducted with minimal additional environmental impacts above those already approved for the Moolarben Coal Complex.

**Table ES-1  
Key Outcomes of the UG1 Optimisation Modification Environmental Reviews**

<b>Environmental Aspect</b>	<b>Summary of Environmental Assessment Conclusions</b>	<b>Key Management, Mitigation or Monitoring Measures for the UG1 Optimisation Modification</b>
Built Features <sup>1</sup>	Consistent with the performance measures outlined in Table 16 of NSW Project Approval (08_0135).	Implementation of Extraction Plan for UG1.
Cliffs and Steep Slopes	Consistent with the performance measures outlined in Table 15 of NSW Project Approval (08_0135).	Implementation of Extraction Plan for UG1.
Groundwater Resources	No adverse affects predicted on third-party groundwater users (in terms of the minimal harm considerations of the Aquifer Interference Policy). No material impact predicted on stream baseflow or natural river leakage for any nearby stream. Negligible drawdown in the alluvial aquifers.	Continued implementation of groundwater monitoring and management would continue to be conducted in accordance with the Water Management Plan. Holding of adequate groundwater licenses.
Surface Water Resources	No significant change to site water balance expected. No significant change to approved environmental consequences or proposed management measures for unnamed drainage lines.	Continued implementation of water management system and water monitoring network. Monitoring and remediation (if required) for potential subsidence impacts through Extraction Plan process.
Noise	Negligible exceedance (1 decibel) of Project Approval noise limit at one privately-owned receiver. Compliance with all other existing Project Approval noise limits.	Continued implementation of: <ul style="list-style-type: none"> <li>• At source noise controls.</li> <li>• Predictive meteorological forecasting.</li> <li>• Real-time noise monitoring and performance indicators.</li> <li>• Attended noise monitoring.</li> </ul>
Air Quality	Compliance with existing Project Approval air quality limits.	Continued implementation of: <ul style="list-style-type: none"> <li>• At source dust controls.</li> <li>• Predictive meteorological forecasting.</li> <li>• Real-time monitoring and performance.</li> </ul>
Ecology	Disturbance of approximately 8.4 hectares of derived native grassland <sup>2</sup> . The UG1 Optimisation Modification in conjunction with the OC4 South-West Modification would result in a reduction in the total area to be disturbed by the approved Moolarben Coal Complex. No significant impacts to threatened species, populations or communities.	Existing Stage 2 Biodiversity Offset Strategy adequately compensates potential impacts, with surplus area. Continued implementation of vegetation clearance protocols.
Aboriginal Heritage	Potential direct impacts to two isolated stone artefacts of low archaeological significance. No significant impact to Aboriginal sites as a result of additional subsidence is anticipated.	Continued implementation of monitoring and management measures through Heritage Management Plan. Salvage of sites that would be directly impacted as a result of surface disturbance works.
Road Transport	No significant impacts on the performance, capacity, efficiency and safety of the road network.	Continued contributions to road maintenance in accordance with Project Approval (05_0117) and Project Approval (08_0135).
Community Infrastructure	Existing community infrastructure in the Mid-Western Regional LGA is capable of servicing the increased population associated with the anticipated increase in the Moolarben Coal Complex workforce.	Additional contributions in accordance with Project Approval (08_0135) to reflect the anticipated increase in the Moolarben Coal Complex workforce. Continued support for local organisations in the region and continued contributions to Mid-Western Regional Council in accordance with Moolarben Coal Complex Planning Agreement and Project Approval (05_0117).
Visual	Negligible change in potential visual impacts from sensitive viewpoints.	Continued implementation of visual mitigation measures.

<sup>1</sup> Refer Table 16 of NSW Project Approval (08\_0135).

<sup>2</sup> The vegetation mapping is considered to be conservative as parts of the area have a recent history of clearing and cultivation and some areas may be classified as regrowth.



# Moolarben Coal Complex UG1 Optimisation Modification

## Environmental Assessment

# ENVIRONMENTAL ASSESSMENT



## TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1	3.7 WASTE MANAGEMENT	25
1 INTRODUCTION	1	3.8 MANAGEMENT OF DANGEROUS GOODS	25
1.1 BACKGROUND	1	3.9 WORKFORCE	25
1.1.1 Moolarben Coal Complex History	1	3.10 CONSTRUCTION ACTIVITIES	25
1.1.2 Neighbouring Mine Operations/Projects	5	3.11 REHABILITATION	25
1.2 MODIFICATION OVERVIEW	5	4 ENVIRONMENTAL ASSESSMENT	26
1.2.1 Project Justification	9	4.1 SUBSIDENCE	26
1.3 SITE LOCATION AND TENURE	9	4.1.1 Environmental Review	26
1.4 CONSULTATION	9	4.1.2 Mitigation Measures, Management and Monitoring	31
1.4.1 Public Consultation	12	4.2 GROUNDWATER RESOURCES	31
1.5 STRUCTURE OF THE EA	12	4.2.1 Background	31
2 SUMMARY DESCRIPTION OF EXISTING/APPROVED MOOLARBEN COAL COMPLEX	13	4.2.2 Environmental Review	32
2.1 APPROVALS HISTORY	13	4.2.3 Mitigation Measures, Management and Monitoring	33
2.2 CONSTRUCTION	14	4.3 NOISE	33
2.3 OPEN CUT MINING	14	4.3.1 Background	33
2.4 UNDERGROUND MINING	14	4.3.2 Environmental Review	34
2.5 COAL HANDLING AND PREPARATION	14	4.3.3 Mitigation Measures, Management and Monitoring	38
2.6 PRODUCT COAL TRANSPORT	15	4.4 AIR QUALITY	39
2.7 WASTE ROCK MANAGEMENT	15	4.4.1 Background	39
2.8 COAL REJECT MANAGEMENT	15	4.4.2 Environmental Review	40
2.9 GENERAL INFRASTRUCTURE	15	4.4.3 Mitigation Measures, Management and Monitoring	41
2.9.1 Site Access and Infrastructure Areas	15	4.5 ECOLOGY	41
2.9.2 Electricity Supply and Distribution	16	4.5.1 Background	41
2.9.3 Potable Water	16	4.5.2 Environmental Review	44
2.9.4 Ancillary Infrastructure	16	4.5.3 Mitigation Measures, Management, Monitoring and Offset	44
2.10 WATER MANAGEMENT	16	4.6 SURFACE WATER RESOURCES	45
2.11 WASTE MANAGEMENT	17	4.6.1 Background	45
2.12 MANAGEMENT OF DANGEROUS GOODS	17	4.6.2 Environmental Review	45
2.12.1 Hydrocarbon Storages	17	4.6.3 Mitigation Measures, Management and Monitoring	47
2.12.2 Explosives Storage	17	4.7 ABORIGINAL HERITAGE	47
2.13 WORKFORCE	17	4.7.1 Background	47
2.14 REHABILITATION	17	4.7.2 Environmental Review	48
2.14.1 Rehabilitation Objectives	18	4.7.3 Management and Mitigation Measures	50
2.14.2 Rehabilitation Monitoring	19	4.8 ROAD TRANSPORT	50
2.15 ENVIRONMENTAL MANAGEMENT AND MONITORING	19	4.8.1 Background	50
2.16 COMMUNITY CONTRIBUTIONS	19	4.8.2 Environmental Review	50
2.17 COMPLAINTS	21	4.8.3 Management and Mitigation Measures	53
3 DESCRIPTION OF THE PROPOSED MODIFICATION	22	4.9 COMMUNITY INFRASTRUCTURE	53
3.1 UNDERGROUND MINING OPERATIONS	22	4.9.1 Background	53
3.2 OPEN CUT MINING OPERATIONS	23	4.9.2 Environmental Review	53
3.3 PRODUCT COAL TRANSPORT	23	4.9.3 Management and Mitigation Measures	54
3.4 COAL HANDLING AND PREPARATION INFRASTRUCTURE	23	4.10 VISUAL	54
3.4.1 Underground Coal Handling	23	4.10.1 Background	54
3.4.2 Coal Preparation Plant	23	4.10.2 Environmental Review	57
3.5 GENERAL INFRASTRUCTURE	23	4.10.3 Mitigation Measures and Management	57
3.5.1 Underground Mine Infrastructure Area	23	4.11 OTHER ENVIRONMENTAL ASPECTS	58
3.5.2 Remote Services Facilities	24	4.11.1 Land Resources	57
3.5.3 Rear Air Intake Shaft	24	4.11.2 Greenhouse Gas Emissions	59
3.6 WATER MANAGEMENT	24	4.11.3 Non-Aboriginal Heritage	59
		4.11.4 Blasting	60
		4.11.5 Aquatic Ecology	60
		4.11.6 Hazard and Risk	60



**TABLE OF CONTENTS (Continued)**

5	STATUTORY CONTEXT	61
5.1	GENERAL STATUTORY CONSIDERATIONS	61
5.1.1	State Legislation	61
5.1.2	Other State Legislation	62
5.1.3	Environmental Planning Instruments	63
5.1.4	Commonwealth Legislation	68
5.2	NSW GOVERNMENT POLICY	69
5.2.1	Strategic Regional Land Use Plan	69
5.2.2	Aquifer Interference Policy	69
5.3	APPROVALS, LICENCES AND PLANS	70
5.3.1	Project Approval Conditions	70
5.3.2	Extraction Plan	71
5.3.3	Mining Operations Plan	71
5.3.4	Environment Protection Licence Conditions	71
5.3.5	Management/Monitoring Plans	71
6	REFERENCES	72

**LIST OF TABLES**

Table 1	Summary Comparison of Approved and Modified Moolarben Coal Project
Table 2	Comparison of Predicted Systematic Subsidence Effects for the Approved and Modified Mining Layouts
Table 3	Subsidence Impact Performance Measures
Table 4	Native Vegetation Communities Recorded
Table 5	Indicative Shift Times and Workforce at the Moolarben Coal Complex
Table 6	Summary of Visual Impacts

**LIST OF FIGURES**

Figure 1	Regional Location
Figure 2	Approved Moolarben Coal Project (Stage 1 and Stage 2) General Arrangement
Figure 3	Aerial Photo of the Moolarben Coal Complex (May 2014)
Figure 4	Proposed General Arrangement
Figure 5a	Relevant Land Ownership Plan
Figure 5b	Relevant Landholder List
Figure 6	Moolarben Coal Complex Environmental Monitoring Sites
Figure 7	Natural and Built Features within the Modification Area
Figure 8	Relevant Noise, Blasting and Dust Monitoring Site Locations
Figure 9	Modification Year 2018 Night-time Operational Noise Contours
Figure 10	Modification Year 2016 24 hour PM <sub>10</sub> Air Quality Contours
Figure 11	Sub-catchments at the Moolarben Coal Complex and Relevant Surface Water Monitoring Locations

**LIST OF FIGURES (Continued)**

Figure 12	Aboriginal Cultural Heritage Sites
Figure 13	Relevant Traffic Survey Locations
Figure 14	Previously Assessed Sensitive Viewpoints and Proposed Surface Infrastructure

**LIST OF ATTACHMENTS**

Attachment 1	Stage 1 Project Approval (05_0117)
Attachment 2	Stage 2 Project Approval (08_0135)
Attachment 3	Site Verification Certificate

**LIST OF APPENDICES**

Appendix A	Subsidence Assessment
Appendix B	Groundwater Assessment
Appendix C	Noise Assessment
Appendix D	Air Quality Assessment
Appendix E	Flora and Fauna Impact Assessment
Appendix F	Surface Water Assessment Review
Appendix G	Aboriginal Cultural Heritage Assessment
Appendix H	Road Transport Assessment
Appendix I	Community Infrastructure Assessment

## 1 INTRODUCTION

The Moolarben Coal Complex is located approximately 40 kilometres (km) north of Mudgee in the Western Coalfields 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 (Yancoal).

The Moolarben Coal Complex comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG1, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities) (Figure 2).

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).

Stage 1 mining operations are undertaken in accordance with Approval Decisions EPBC 2007/3297 granted on 24 October 2007 (and varied by notice on 25 February 2009 and 11 May 2010) and EPBC 2013/6926 granted on 13 November 2014 under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). The current mining operations are also conducted in accordance with the requirements of the conditions of Mining Lease (ML) 1605, ML 1606, ML 1628 and ML 1691 granted under the *Mining Act, 1992*.

Since commencement of coal mining operations in 2010, mining activities have occurred within OC1 and OC2 (Figure 3). Subject to all necessary approvals being in place (both State and Commonwealth), development of the OC4 pit (Stage 2) is planned to commence during 2015. The development of the UG1 (i.e. highwall stabilisation, portal construction and drivage development) would also commence in 2015.

This Environmental Assessment (EA) has been prepared by MCO to support a request to modify both the Stage 1 and Stage 2 Project Approvals (05\_0117 and 08\_0135, respectively) under section 75W of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) (the UG1 Optimisation Modification).

The UG1 Optimisation Modification includes the reconfiguration of underground longwall panels (UG1), relocation of approved mine infrastructure, construction of coal handling infrastructure, Remote Services Facilities and rear air intake facilities, and increase in the approved workforce.

A copy of Project Approval (05\_0117) and Project Approval (08\_0135) are provided as Attachments 1 and 2.

### 1.1 BACKGROUND

#### 1.1.1 Moolarben Coal Complex History

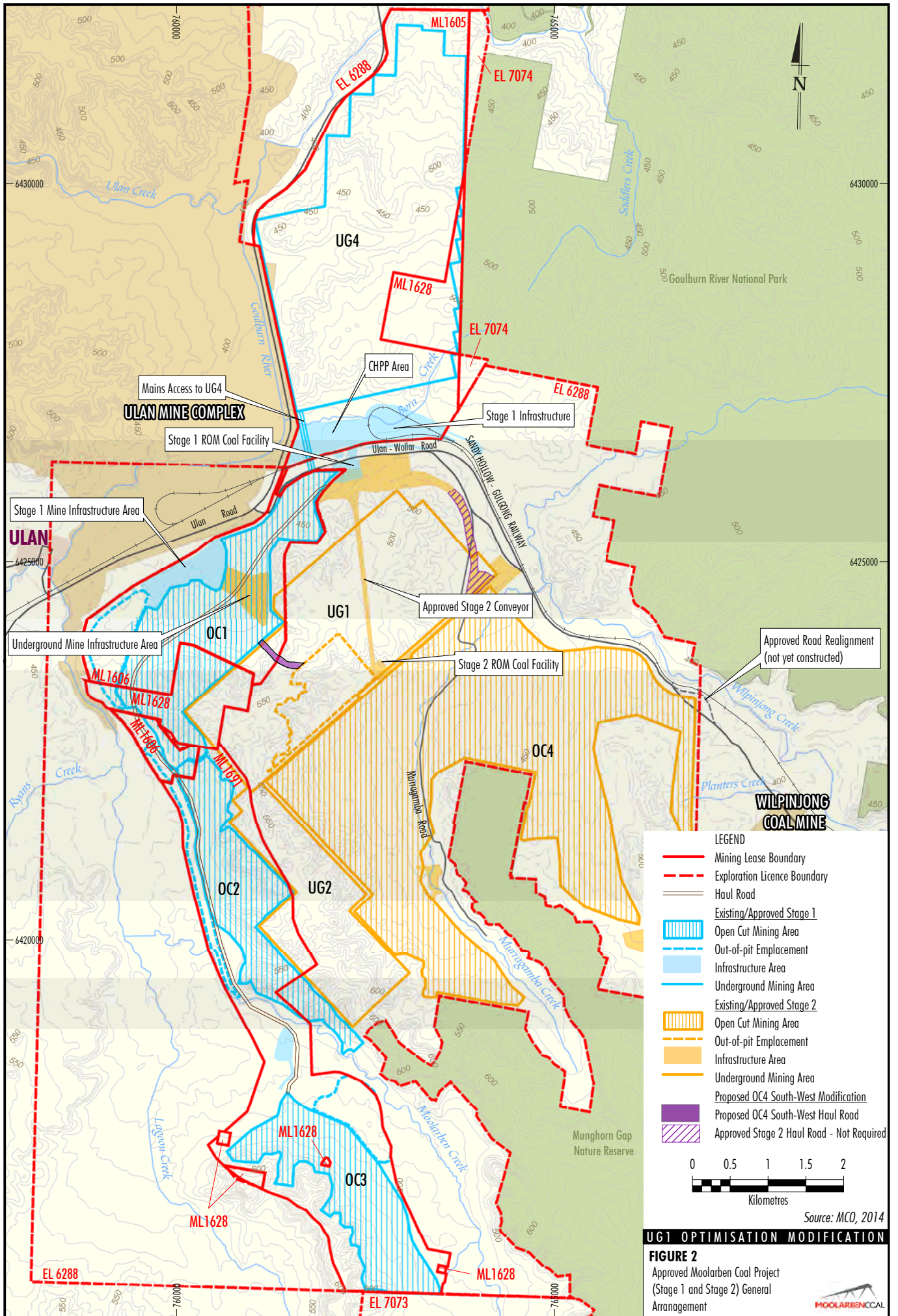
The Moolarben Coal Project (Stage 1) was assessed in the *Moolarben Coal Project Environmental Assessment Report* (Moolarben Coal Mines Pty Limited, 2006) (Stage 1 EA) and was approved by the NSW Minister for Planning on 6 September 2007 (Stage 1 Project Approval [05\_0117]).

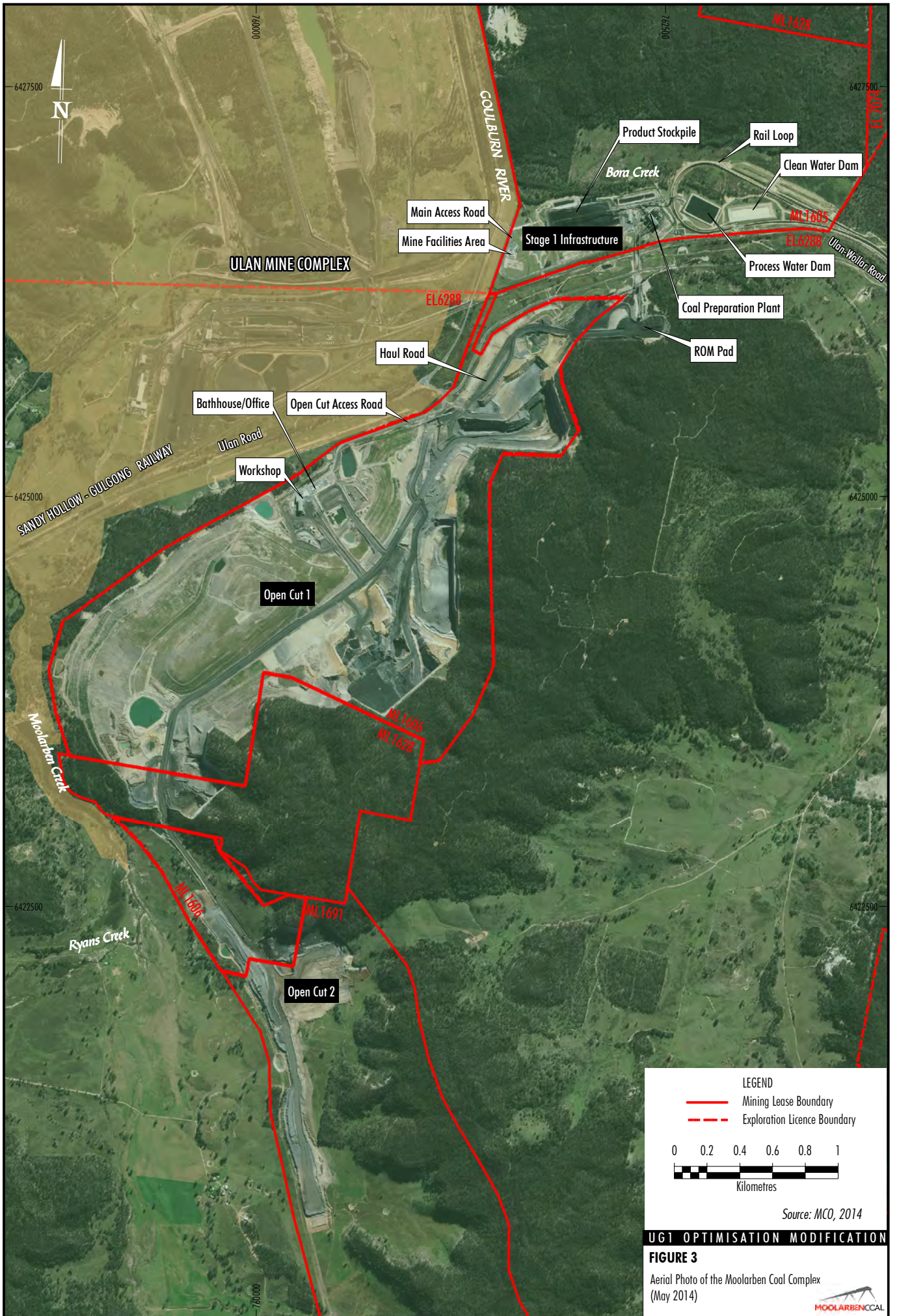
Stage 1 Project Approval (05\_0117) has been subject to ten modifications. The modifications were generally required to reconfigure the mine layout (e.g. extension to mining areas, relocation of coal handling infrastructure and water infrastructure) and were aimed to improve the efficiency and operation of the Moolarben Coal Complex and enable access to additional economically viable coal reserves.

A Major Project Application for the Moolarben Coal Project (Stage 2) was lodged with the NSW Minister for Planning on 1 May 2008. Following exhibition of the Moolarben Coal Project Stage 2 Environmental Assessment (Stage 2 EA), MCM made a number of changes to the proposed layout and design of the Moolarben Coal Project Stage 2 in order to address issues raised by the Department of Planning and Infrastructure (DP&I) (now Department of Planning and Environment [DP&E]) and its independent technical reviewers, introduce additional impact avoidance measures and to enable the effective integration of Stage 2 with Stage 1. Changes to the Moolarben Coal Project Stage 2 were described in a Preferred Project Report (Stage 2 PPR) which was exhibited from 31 January 2012 to 24 February 2012.

The Moolarben Coal Project Stage 2 was approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning) on 30 January 2015 (Stage 2 Project Approval [08\_0135]).







Modification 3 of Stage 1 of the Moolarben Coal Project was approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning) on 30 January 2015. Modification 3 allows for Stage 1 infrastructure to receive, handle and process Stage 2 coal for the life of Stage 2 (to 31 December 2038) and aligns approved mine operation timeframes between Stage 1 and Stage 2. An additional void at the northern end of OC1 was also approved to allow access to UG4.

A summary description of the existing/approved Moolarben Coal Complex is provided in Section 2. The general arrangement of the existing/approved Moolarben Coal Complex is shown on Figure 2.

### ***Moolarben Coal Project OC4 South-West Modification***

On 17 April 2015, MCO lodged a modification application with DP&E to realign the Stage 2 Haul Road (the OC4 South-West Modification and revise the location of a temporary infrastructure area within OC4). The OC4 South-West Modification is subject to separate environment assessment and approval.

The OC4 South-West Modification has been considered where appropriate in this UG1 Optimisation Modification EA.

#### **1.1.2 Neighbouring Mine Operations/Projects**

Potential interactions with neighbouring mine operations/projects to the Moolarben Coal Complex have been considered where relevant in this EA, including the Ulan Mine Complex and the Wilpinjong Coal Mine.

##### *Ulan Mine Complex*

The Ulan Mine Complex is located adjacent to and north-west of the Moolarben Coal Complex (Figure 1) and is operated by Ulan Coal Mines Limited (UCML) and managed by Glencore.

Operations at the Ulan Mine Complex are undertaken in accordance with Project Approval (08\_0184) for the Ulan Continued Operations Project. The Ulan Mine Complex is approved to operate up to a maximum coal export capacity (from the site) of 20 million tonnes per annum (Mtpa) and all product coal is transported from the site by rail.

The location and extent of the approved Ulan Mine Complex are shown on Figure 2.

##### *Wilpinjong Coal Mine*

The Wilpinjong Coal Mine is located adjacent to and east of the Moolarben Coal Complex (Figures 1 and 2) and is owned and operated by Wilpinjong Coal Pty Ltd (WCPL), a wholly owned subsidiary of Peabody Energy Australia Pty Limited.

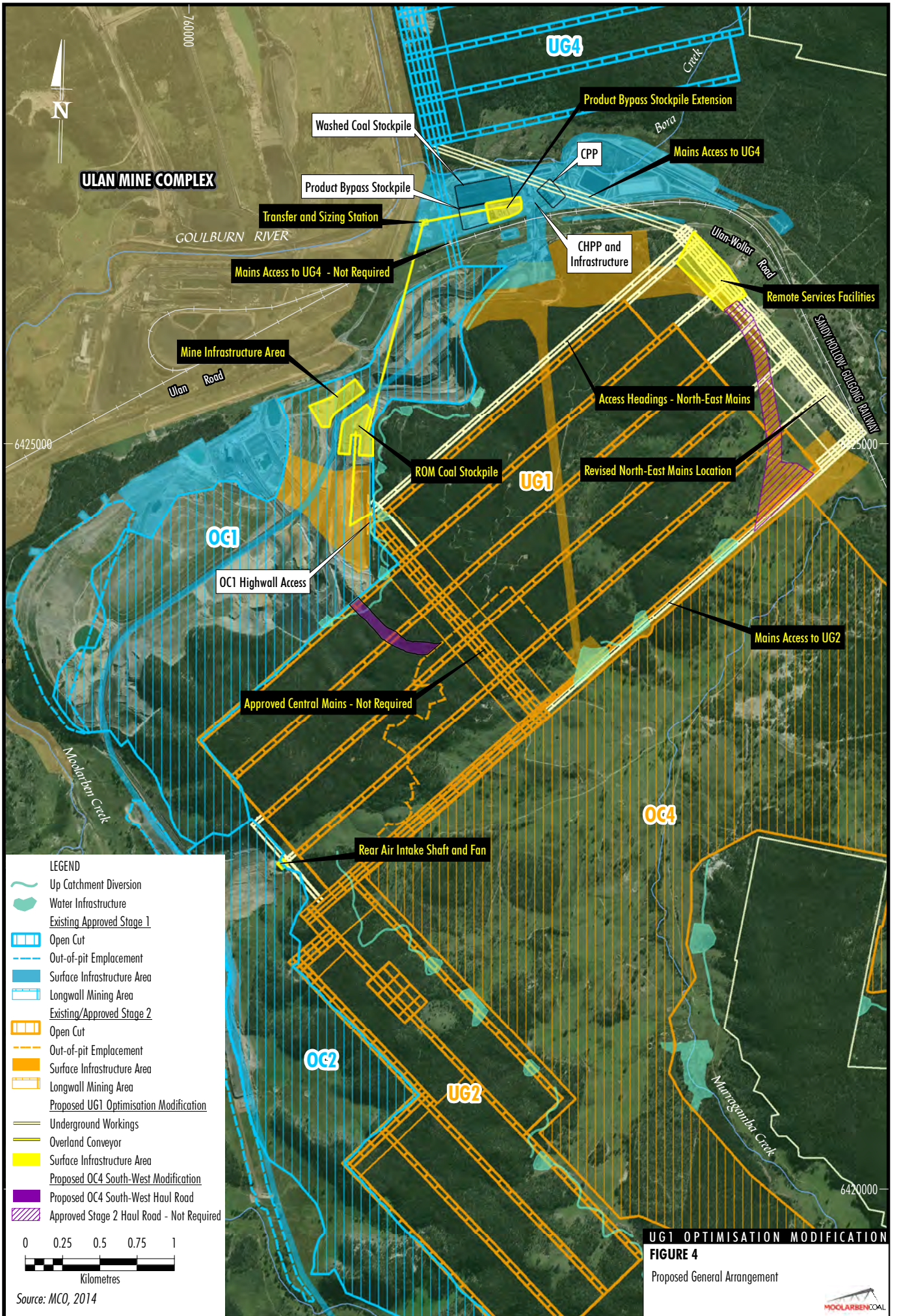
Operations at the Wilpinjong Coal Mine are undertaken in accordance with Project Approval (05\_0021) for the Wilpinjong Coal Project. The Wilpinjong Coal Mine is approved to operate up to a maximum coal export capacity (from the site) of 12.5 Mtpa and all product coal is transported from the site by rail.

The location and extent of the approved Wilpinjong Coal Mine are shown on Figure 2.

## **1.2 MODIFICATION OVERVIEW**

The UG1 Optimisation Modification includes the following key components (Figure 4):

- recovery of approximately 3.7 million tonnes (Mt) of additional run-of-mine (ROM) coal over the life of the mine;
- an extension of UG1 longwall panels in the north-east by approximately 150 to 500 metres (m);
- an extension of two UG1 longwall panels in the south-west by approximately 75 m;
- relocation of the approved UG1 central main headings to the north-east;
- relocation of underground access to UG2 and UG4;
- longwall extraction of the portion of coal that forms the approved (central) main headings;
- an increase in the coal seam extraction height by approximately 300 millimetres (mm) to a maximum extraction thickness of 3.5 m;
- an increase to longwall panel void width from approximately 305 to 311 m;
- construction of a ROM coal conveyor (including crushing and screening station and transfer points) between the UG1 pit top facilities in OC1 and the coal handling and preparation plant (CHPP) to transport underground ROM coal;
- extension to the underground product coal stockpile in the CHPP area and relocation and expansion of the underground ROM coal stockpile at the UG1 pit top facilities;



- an increase in the maximum underground ROM coal production rate up to 8 Mtpa from UG1, UG2 and UG4 (combined);
- an increase in the maximum total site ROM coal rate to 21 Mtpa (i.e. 13 Mtpa from open cut operations and 8 Mtpa from underground operations);
- an increase in average daily rail departures from five to seven and increase in peak daily rail departures to nine;
- construction of Remote Services Facilities (including facilities and services necessary for the operation of an underground mine) and rear air intake shaft and associated fans above the extended UG1 longwall panels; and
- relocation of the underground Mine Infrastructure Area and site administration offices.

Table 1 provides a summary comparison of the currently approved Moolarben Coal Complex under the Stage 1 Project Approval (05\_0117) and Stage 2 Project Approval (08\_0135), and the Moolarben Coal Complex incorporating the UG1 Optimisation Modification.

As shown in Table 1, the UG1 Optimisation Modification **does not** involve any change to the Moolarben Coal Project (Stages 1 and 2) for the following relevant approval components:

- operational mine life;
- hours of operation;
- blasting limits;
- Biodiversity Offset Strategy;
- site access; or
- open cut coal extraction limits.

A detailed description of the proposed UG1 Optimisation Modification is provided in Section 3.

Section 4 describes the potential environmental impacts of the UG1 Optimisation Modification and discusses how existing requirements in environmental management and monitoring programs at the Moolarben Coal Complex would be applied to manage potential environmental impacts.

**Table 1  
Summary Comparison of Approved and Modified Moolarben Coal Project**

Relevant Approval Component	Moolarben Coal Project		Moolarben Coal Project (including the UG1 Optimisation Modification)
	Stage 1 Project Approval (05_0117)	Stage 2 Project Approval (08_0135)	
Operational Mine Life	Mining operations can be carried out until 31 December 2038.		Unchanged.
Hours of Operation	Mining operations can be carried out 24 hours a day, 7 days a week.		Unchanged.
Blasting Limits	A maximum of 2 blasts a day and up to 9 blasts a week (averaged over a calendar year) can be carried out at the Moolarben Coal Complex.		Unchanged.
	Blasting can be carried out on site between 9.00 am and 5.00 pm Monday to Saturday inclusive. No blasting is allowed on Sundays, public holidays, or at any other time without the written approval of the Secretary.		Unchanged.
Coal Extraction Limits	Up to 9 Mtpa of ROM coal can be extracted from the open cut mining operations in calendar years 2015 and 2016, and 8 Mtpa thereafter, from Stage 1.	Up to 12 Mtpa of ROM coal can be extracted from the open cut mining operations in any calendar year from Stage 2.	Unchanged.
	Up to 4 Mtpa (total) of ROM coal can be extracted from the underground mining operations at the Moolarben Coal Complex in any calendar year.		Up to 8 Mtpa (total) of ROM coal would be extracted from the underground mining operations at the Moolarben Coal Complex in any calendar year.
Coal Processing and Offsite Transport	Up to 13 Mtpa (total) of ROM coal from the Moolarben Coal Complex can be processed in any calendar year from Stages 1 and 2.		Unchanged.



**Table 1 (Continued)**  
**Summary Comparison of Approved and Modified Moolarben Coal Project**

Relevant Approval Component	Moolarben Coal Project		Moolarben Coal Project (including the UG1 Optimisation Modification)
	Stage 1 Project Approval (05_0117)	Stage 2 Project Approval (08_0135)	
Coal Processing and Offsite Transport (Cont.)	All coal is to be transported from the Moolarben Coal Complex by rail.	The Proponent shall ensure that all coal extracted from the site is sent to the Moolarben Stage 1 mine surface infrastructure area for processing and/or transport to market.	Up to 18 Mtpa of coal would be exported from the site in any calendar year. Average rail departures of up to seven per day and peak rail departures of up to nine per day.
General Layout	The general layout is shown in Appendix 2A of Project Approval (05_0117).	The general layout is shown in Appendix 2 of Project Approval (08_0135).	The revised general layout is shown on Figure 4 and includes the following key changes: <ul style="list-style-type: none"> <li>• Addition of coal handling infrastructure from the UG1 pit top facilities to CHPP area.</li> <li>• Alteration to underground longwall panel arrangement.</li> <li>• Relocation of the Mine Infrastructure Area within approved surface disturbance area (OC1).</li> <li>• Addition of Remote Services Facilities area.</li> <li>• Addition of rear air intake shaft and fan.</li> </ul>
Biodiversity Offset Strategy	The Biodiversity Offset Strategy is shown conceptually in Appendix 8 of Project Approval (05_0117).	The Biodiversity Offset Strategy is shown conceptually in Appendix 7 of Project Approval (08_0135).	No change required.
Northern Section of the Approved Stage 2 Haul Road and Stage 2 ROM coal facility	N/A	Additional archaeological survey work of the Stage 2 Haul Road and Stage 2 ROM coal facilities is to be carried out prior to carrying out the development.	Unchanged.
Ulan-Wollar Road Site Access	N/A	The site access intersection off Ulan-Wollar Road is to be designed, constructed, and maintained to the satisfaction of Mid-Western Regional Council (MWRC).	Unchanged.
Water Management Design and Objectives	Design, install and maintain the dams generally in accordance with the series <i>Managing Urban Stormwater: Soils and Construction – Volume 1 and Volume 2E Mines and Quarries</i> .		Objectives remain unchanged. A change to the general location of some of the sediment dams would be required.
	Maximise as far as reasonable and feasible the diversion of clean water around disturbed areas on-site.		Objectives remain unchanged. A change to the general location of some of the up-catchment water diversions would be required.
	Mine water storage infrastructure is designed to store a 50 year average recurrence interval 72 hour storm event.	Mine water storage infrastructure is designed to store a 100 year average recurrence interval 72 hour storm event.	Objectives remain unchanged.
	On-site storages (including tailings dams, mine infrastructure dams, groundwater storage and treatment dams), and the Ulan Seam sub-crop line of the most northerly final void are suitably lined to comply with a permeability standard of less than $1 \times 10^{-9}$ metres per second (m/s). <sup>1</sup>	On-site storages (including tailings dams, mine infrastructure dams, groundwater storage and treatment dams) are suitably lined to comply with a permeability standard of less than $1 \times 10^{-9}$ m/s.	Unchanged.

<sup>1</sup> The OC4 South-West Modification seeks to remove this requirement for the Ulan Seam sub-crop line of the most northerly final void.

### 1.2.1 Project Justification

The UG1 Optimisation Modification would allow the recovery of approximately an additional 3.7 Mt of underground coal.

The UG1 Optimisation Modification would reduce the number of longwall mining equipment relocations from nine to five which would enable more efficient recovery of underground coal.

The proposed UG1 Optimisation Modification would improve the efficiency of integration of mining operations across the complex, access to the UG1 resource and transfer of underground coal to the CHPP area.

### 1.3 SITE LOCATION AND TENURE

The Moolarben Coal Complex is located within ML 1605, ML 1606, ML 1628, ML 1691, mining lease application areas and within Exploration Licence (EL) 6288 and EL 7074.

The Project Application Areas and the real property descriptions are provided in Appendix 1 of the Stage 1 and 2 Project Approvals, which are provided as Attachments 1 and 2 to this EA.

Relevant land ownership information within the immediate vicinity of the Moolarben Coal Complex is provided on Figures 5a and 5b.

The Moolarben Coal Complex is located within the Mid-Western Regional Local Government Area (LGA).

### 1.4 CONSULTATION

MCO consults with relevant State Government agencies on a regular basis in relation to the approved Moolarben Coal Complex.

Consultation has been conducted with key State Government agencies, local councils, the local community and Aboriginal stakeholders during the preparation of this EA. A summary of this consultation to date is provided below. Consultation would continue during the public exhibition of this EA and the assessment of the UG1 Optimisation Modification.

#### **Department of Planning & Environment**

Briefings with the DP&E were conducted in May 2014 and February 2015 to provide an overview of the proposed UG1 Optimisation Modification and the proposed scope of environmental assessment.

#### **Regulatory Agencies and Local Council**

MCO sent briefing letters (dated April 2015) providing an overview description of the UG1 Optimisation Modification and proposed scope of environmental assessment to the following regulatory authorities:

- Office of Environment and Heritage (OEH);
- Environment Protection Authority (EPA);
- Department of Primary Industries – NSW Office of Water (NOW);
- NSW Division of Resource and Energy (DRE) (within Department of Trade, Investment, Regional Infrastructure and Services); and
- Mid-Western Regional Council (MWRC).

#### **Local Community**

A Community Consultative Committee has been established in accordance with both Project Approvals (05\_0117 and 08\_0135) in March 2015.

The Community Consultative Committee provides a mechanism for ongoing communication between MCO and the local community. MCO sent a briefing letter (dated April 2015) to the Chair of the Community Consultative Committee providing an overview description of the UG1 Optimisation Modification and proposed scope of environmental assessment. A description of the UG1 Optimisation Modification was provided to the Community Consultative Committee at its meeting in May 2015.

#### **Other Mines**

MCO works closely with the operations of Ulan Mine Complex and Wilpinjong Coal Mine managing cumulative impacts associated with mining operations. The mining operations share their extensive environmental databases through a formal data sharing agreement to support relevant environmental assessments or incident investigations and co-operate in the implementation of joint programs such as the Ulan Road Strategy.

Both UCML and WCPL were consulted in relation to the UG1 Optimisation Modification in April 2015.



Ref No	Landholder	Ref No	Landholder	Ref No	Landholder
9	Orica Australia Pty Limited	114	TF & K Holland	218	GF & GEL Soady
11	JE Mullins & CD Imrie	115	AK & BH Ouinn	219	T & S Riger
26	Forty North Pty Limited	116	DJ & SM Reid	220	SJ Rusten & NJ Smith
30	RB Cox	117	JM Dick	222	BJ Purtell
31	MB Cox	118	A Scott	223	EW Palmer & JM Stewart
32	DJ & JG Stokes	119	PJ Kearns	224	RS & PCC Dupond
34	J Asztalos	120	PS & DR Ord	225	G & RF Doualetas
37	J Szymkarczuk	121	EJ Cullen	226	LAA & FC Muscat
39	RM & DJ Sprigg	122	WF Wirth	227	WP & JA Hughes
40	JM Devenish	123	ND Sullivan	229	JJ & BA Lowe
41	PP Libertis	124	WJ & HE Bailey	230	DA Hoole & DT Rawlinson
42	C & L Schmidt	125	DB McBride	231	T Morrison & SM Benny
46	North Eastern Wiradjuri Wilpinjong Community Fund Limited	126	MP Julian	232	L & JA Haaring
47	SF & MR Andrews	127	BKT & SA Bracken	233	K & D Boal
53	WD & MS Bryant	128	AW Sims	234	D & L Gaw
54	MA & C Harris	129	M Yelds	235	LM & RS Wilson
56	MJ & V Cundy	130	GP McEwen	236	RG & CA Donovan
59	G & GM Szymkarczuk	131	GR & RA King	237	A Puskaric
60	CL Rayner & DM Munday	132	N Atkins	238	B Powell
61	MA Miller	149	Mid-Western Regional Council	240	GJ & DM Hartley
62	R Menchin	160	Minister For Education And Training	244	JT & YR Jones
63	BF & B Whiticker	162	DM Harrison	245	MP & KLE Cresham
66	Rostherne Pty Limited	168	PJL Constructions Pty Limited	247	J & K Batshon
70	DJ & A Coventry	171	AD & SA McGregor	248	G Boustani
75	P Ban	178	PR Stone	249	CJ & JI Eldridge
76	SR & PC Carbone	180	CD & LL Barrett	251	NF Potter & CE Selley
79	PTJ & SE Nagle	181	SM Forster	255	HJ & H Schmitz
80	W & D Sebelic	182	J Dutoitcook	256	RC Campbell
82	SC Hungerford & MC Clemens	183	R & EA Steines	258	PM & CD Elias
83	CF & CR Wall	184	LA Stevenson	300	CM Collins & CY Marshall
84	DS Sebelic	186	RW & IJ Adamson	303	HJ Ungaro
85	J & Z Nikolovski	187	BT & KM Feeney	304	G Balajan
86	NW Harris	188	KR & T Fielding	305	L Barisic & M Aul
87	BJ & K Howe	189	M, M, D & A Goggin & J, A, P & R Hyde	306	E Armstrong
88	BC Meyers	190	T & LK Sahyoun	307	M Chant & NK Young
89	MV & HM Glover & E & BJ Tomlinson	191	BW & TS Lasham	308	NA Dower
90	SA Powell	192	D Williams	309	GS Maher
91	HM Graham	193	DJ Moloney	310	KI Death
92	VA Pullicino & J & S & G Bonnici	194	PM & K Potts	311	BJ & LC Williamson
93	F & M Fenech	195	R Cottam	312	MS & JJ Ioannou
94	LK Mittemayer	196	F Saxberg & M Weir	313	NJ & BDE Pracy
95	BJ Withington	198	GR & ME Metcalfe	314	SL Ford
96	D Lazicic	199	PGG & I Nielsen	315	WJ Richards & BJ Uzelac
97	DJ & MD Smith	200	VK Grimshaw	316	CR Vassel & CM Williams
98	ME & JJ Piper	201	KR & GM Towerton	317	RJ Hore & V Bingham
99	DE Jenner & WB Jensen	202	H & VF Butler	325	S & T Fevale
100	A Kapišta	203	DJ Miller	326	AW & LM Murray
101	RD & DMZ Hull	204	RB & JE Donnan	327	CA Tanner
102	KA Roberts	205	DW Sparrow & M Tallan	328	Essential Energy
103	SB Burnett & SL Grant	206	CA Marshall & R Vella	329	G Tuck-Lee
104	RA & LA Deeben	207	AA & DM Smith		
105	DJ & N Katsikaris	208	SA & CR Hasaart		
106	TB & JH Reid	209	F Mawson		
107	ZJ & M & AA Raso	210	JM & AM Tebutt		
108	R Varga	211	SA McGregor & WJ Gray		
109	DA Evans	212	E & M Lepik		
110	JT Thompson & HT Evans	213	D & J Parsonage		
111	GJ & NJ McEwan	214	RK & EG O'Neil		
112	MJ & LM Croft	215	SG & PM Green		
113	CPG Ratcliff	216	G Holland & FA Handicott		
		217	RP & JL Patterson		

Source: MCO, Feb 2015

UG1 OPTIMISATION MODIFICATION

**FIGURE 5b**  
Relevant Landholder List



#### 1.4.1 Public Consultation

The Moolarben Coal website ([www.moolarbencoal.com.au](http://www.moolarbencoal.com.au)) provides regular updates on the Moolarben Coal Complex and provides access to relevant environment and community information, including EA documents, compliance reports and approval documents.

An environmental enquiry phone line (1800 556 484) allows members of the public to contact MCO with enquiries or complaints.

A copy of this EA would be made available on the Moolarben Coal website.

Attachments 1 to 3 and Appendices A to G provide supporting information as follows:

Attachment 1	Stage 1 Project Approval (05_0117)
Attachment 2	Stage 2 Project Approval (08_0135)
Attachment 3	Site Verification Certificate
Appendix A	Subsidence Assessment
Appendix B	Groundwater Assessment
Appendix C	Noise Assessment
Appendix D	Air Quality Assessment
Appendix E	Flora and Fauna Impact Assessment
Appendix F	Surface Water Assessment Review
Appendix G	Aboriginal Cultural Heritage Assessment
Appendix H	Road Transport Assessment
Appendix I	Community Infrastructure Assessment

#### 1.5 STRUCTURE OF THE EA

This EA is structured as follows:

Section 1	Provides an overview of the existing/approved Moolarben Coal Complex, the UG1 Optimisation Modification and a summary of the consultation undertaken in relation to the UG1 Optimisation Modification.
Section 2	Provides a description of the existing/approved Moolarben Coal Complex.
Section 3	Provides a description of the UG1 Optimisation Modification.
Section 4	Provides a review of the existing environment, assesses the potential impacts associated with the UG1 Optimisation Modification and describes the existing MCO environmental management systems and measures in place to manage and monitor any potential impacts.
Section 5	Provides the planning framework and statutory context.
Section 6	References.

## 2 SUMMARY DESCRIPTION OF EXISTING/APPROVED MOOLARBEN COAL COMPLEX

### 2.1 APPROVALS HISTORY

#### *Moolarben Coal Project (Stage 1)*

The Moolarben Coal Project Stage 1 was approved under Part 3A of the EP&A Act by the NSW Minister for Planning on 6 September 2007 (Project Approval [05\_0117]). Ten Modifications to Project Approval (05\_0117) have since been approved, as summarised below.

- **MOD 1:** In August 2008, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to reconfigure the Coal Preparation Plant, emergency tailings dam, transfer stations and conveyors, rail loop, coal stockpiles, UG4 conveyor, groundwater treatment ponds and a water storage dam as well as amend the wording of three clauses in the Project Approval. The modification was approved by the NSW Minister for Planning on 26 November 2008.
- **MOD 2:** In December 2008, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to permit minor construction activities to commence at the site prior to completion of the main mine site access intersection off Ulan-Cassilis Road. The modification was approved by the NSW Minister for Planning on 18 December 2008.
- **MOD 3:** In February 2009, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to allow for Stage 1 infrastructure to receive, handle and process Stage 2 coal for the life of Stage 2 (to 31 December 2038). An additional void in OC1 was also proposed to allow access to UG4. The modification was approved by the NSW Planning Assessment Commission (as delegate of the NSW Minister for Planning) on 30 January 2015.
- **MOD 4:** In April 2009, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to change the configuration of the rail loop from a figure-8 to a balloon loop layout. The modification was approved by the NSW Minister for Planning on 30 June 2009.
- **MOD 5:** In July 2009, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to relocate the ROM coal facility and develop a water sharing pipeline from the Ulan Mine Complex. The modification was approved by the NSW Minister for Planning on 5 October 2009.
- **MOD 6:** In December 2009, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to relocate the rejects bin to a preferred location about 250 m north-west of its previously approved location. The modification was approved by the NSW Minister for Planning on 11 January 2010.
- **MOD 7:** In March 2010, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act for the development and operation of a water supply and dewatering borefield and associated ancillary facilities. The modification was approved by the NSW Minister for Planning on 3 February 2011.
- **MOD 8:** In April 2010, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to establish and operate a ROM coal stockpile adjacent to the ROM coal dump hopper. The modification was approved by the NSW Minister for Planning on 27 May 2010.
- **MOD 9:** In May 2013, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to increase the extents of the approved Stage 1 open cuts. The modification was approved by the NSW Planning Assessment Commission (as delegate of the NSW Minister for Planning) on 16 June 2014.
- **MOD 10:** In February 2015, MCM submitted an application to modify Project Approval (05\_0117) under section 75W of the EP&A Act to increase the Stage 1 open cut ROM coal production rate from 8 to 9 Mtpa for calendar years 2015 and 2016. The modification was approved by the DP&E (as delegate of the NSW Minister for Planning) on 17 April 2015.

## **Moolarben Coal Project (Stage 2)**

The Stage 2 EA was originally prepared by MCM under Part 3A of the EP&A Act. MCM made a number of changes to the proposed layout and design of the Moolarben Coal Project Stage 2 in order to address issues raised by the DP&I (now DP&E) and its independent technical reviewers, introduce additional impact avoidance measures and to enable the effective integration of Stage 2 with Stage 1. Changes to the Moolarben Coal Project Stage 2 were described in the Stage 2 PPR which was exhibited from 31 January 2012 to 24 February 2012.

The Moolarben Coal Project Stage 2 was approved under Part 3A of the EP&A Act by the NSW Planning Assessment Commission (as delegate of the NSW Minister for Planning) on 30 January 2015 (Project Approval 08\_0135).

## **2.2 CONSTRUCTION**

The majority of Moolarben Coal Project Stage 1 facilities were constructed in 2009, including the office administration complex, ROM pad, CHPP, rail spur, rail loop and rail loading infrastructure. Additional infrastructure construction activities have occurred as required over the life of the mine (Figure 3).

Construction of Moolarben Coal Project Stage 2 facilities is yet to commence.

## **2.3 OPEN CUT MINING**

Four open cut pits (OC1, OC2, OC3 and OC4) targeting the Ulan and Moolarben Seams are approved at the Moolarben Coal Complex.

MCM is currently approved to mine up to 9 Mtpa of ROM coal from OC1, OC2 and OC3 combined in calendar years 2015 and 2016, and 8 Mtpa thereafter (i.e. Stage 1), and up to 12 Mtpa of ROM coal from OC4 (i.e. Stage 2) using conventional open cut coal mining methods. A combined total of 13 Mtpa of ROM coal from Stages 1 and 2 is approved to be processed (i.e. the maximum ROM coal extraction rates from Stages 1 and 2 do not occur simultaneously).

MCO is currently conducting open pit mining at the Moolarben Coal Complex in the OC1 and OC2 pits (Figure 3).

Open cut mining is approved 24 hours per day, 7 days per week.

## **2.4 UNDERGROUND MINING**

Three underground mining areas (UG1, UG2 and UG4) targeting the Ulan Seam are approved to be mined at a combined rate of up to 4 Mtpa. Coal would be recovered using conventional longwall mining and transferred to surface by conveyors.

Underground mining of the Ulan Seam would be undertaken using longwall mining equipment with a maximum seam extraction thickness of approximately 3.2 m.

The main headings and gate roads would be developed using continuous miners.

Highwall entries for UG1 and UG4 mines are approved in the OC1 highwall<sup>1</sup> but have not yet been constructed. Access to UG2 would be via UG1.

Coal from the underground areas is approved to be conveyed to a 100,000 tonnes (t) coal stockpile adjacent to the UG1 entry where it would be loaded into haul trucks and hauled to the Stage 1 ROM coal facilities.

Underground mining is approved 24 hours per day, 7 days per week.

## **2.5 COAL HANDLING AND PREPARATION**

The Moolarben Coal Complex produces washed coal products from the open cut operations and would produce unwashed coal products from the underground operations. The coal handling and preparation infrastructure has been designed to accommodate the processing of raw coal and the handling of washed product coal. The coal handling and preparation infrastructure would be upgraded once underground operations commence to handle raw (bypass) coal.

ROM coal from the open cut operations is transferred to the Stage 1 ROM coal facility or ROM stockpile by internal haul roads. ROM coal from the underground operations would be transferred to the Stage 1 ROM coal facility or ROM stockpile by conveyor and internal haul roads.

<sup>1</sup> The OC4 South-West Modification proposes to backfill the northern OC1 void which would result in access from the OC1 highwall to UG4 being removed. The UG1 Optimisation Modification proposes an alternative access (Section 3).

Coal at the Stage 1 ROM coal facility is conveyed to the Coal Preparation Plant. Crushing and sizing facilities are included at the Stage 1 ROM coal facility and the CHPP. The Moolarben Coal Complex is approved to handle up to 17 Mtpa of ROM coal.

The CHPP area includes an existing 400,000 t open cut (washed) product coal stockpile. An approved 200,000 t underground (unwashed) product coal stockpile is yet to be constructed.

Approved conveyors connecting the Stage 1 ROM coal facility to the OC4 pit are yet to be constructed (Figure 2). Once constructed, these conveyors would allow transfer of OC4 ROM coal to the Stage 1 ROM coal facility and CHPP rejects from the Stage 1 ROM coal facility to OC4.

The Coal Preparation Plant operates up to 24 hours per day, 7 days per week.

## 2.6 PRODUCT COAL TRANSPORT

The Moolarben Coal Complex is approved to export up to 13 Mt of product coal from site each year. Product coal is loaded onto trains using a dedicated rail loop and rail load out facility, and transported to the Port of Newcastle.

Product coal is loaded onto trains 24 hours per day, 7 days per week. Trains arrive and depart the Moolarben Coal Complex 24 hours per day, 7 days per week.

The approved Moolarben Coal Complex requires the dispatch of up to five product coal trains per day.

## 2.7 WASTE ROCK MANAGEMENT

With the exception of the initial boxcut development, overburden and interburden or partings material is progressively placed back in-pit once the coal has been mined.

A combination of temporary and permanent out-of-pit waste rock emplacements are located adjacent to the open cut mining operations (Figure 2).

## 2.8 COAL REJECT MANAGEMENT

The Moolarben Coal Complex generates coarse reject and tailings in the coal preparation process.

Reject and tailings are conveyed from the CHPP to the Stage 1 ROM coal facility and then hauled or conveyed to an open pit void for emplacement.

An emergency tailings storage dam has been constructed adjacent to the Coal Preparation Plant to cater for emergency tailings storage (if required). The dam is also used for runoff and dirty water collection. Tailings in the emergency storage dam are periodically removed and transported for disposal within the open cuts.

## 2.9 GENERAL INFRASTRUCTURE

### 2.9.1 Site Access and Infrastructure Areas

The main infrastructure areas approved at the Moolarben Coal Complex include the CHPP area and rail loading facilities, Stage 1 mine infrastructure area, Stage 2 mine infrastructure area, Stage 1 ROM coal facility and Stage 2 ROM coal facility. Access to these areas is via Ulan Road or Ulan-Wollar Road (Figure 2).

The Moolarben Coal Complex CHPP area and rail loading facilities comprise the Coal Preparation Plant, rail loop, rail loadout, conveyors, hoppers, coal stockpiles, mine water dams, fuel store, workshop, sump, B-double turning loop, office, bathhouse, stores, main substation, hardstand areas, crib shed, car park and a number of service facilities (i.e. potable water, sewerage, electricity, fire services and hydrocarbon management) (Figure 3).

The Stage 1 open cut mine infrastructure area includes a workshop, bathhouse, offices, fuel store, light and heavy vehicle parking and other minor infrastructure and supporting facilities (Figures 2 and 3).

An approved underground Mine Infrastructure Area in the OC1 void adjacent to the UG1 entry (Figure 2), which would comprise offices, bathhouse, substation, sump and ventilation fan (among other ancillary facilities), is yet to be constructed.

The Stage 2 open cut mine infrastructure area would include offices, bathhouses, workshops, final storages, explosive facility and magazine storage. Temporary facilities would be established in advance of mining in OC4.

The Stage 1 and Stage 2 infrastructure would be integrated where possible to allow services and facilities to be shared between Stage 1 and Stage 2 operations.

The Stage 1 ROM coal facility includes sizing stations, crushers, conveyors, dump hoppers and other associated infrastructure (Figure 2).



The Stage 2 ROM coal facility and access road have not yet been constructed.

Minor disturbance associated with approved ancillary works would continue to be developed outside of open cut pit and infrastructure disturbance boundaries, including (but limited to) firebreaks, water diversion structures, minor contour banks, tracks, pipelines, explosives/magazine storage facilities, power supply for rope shovel, powerlines, fences and sediment and erosion control structures as required.

### 2.9.2 Electricity Supply and Distribution

Power is supplied to the Moolarben Coal Complex at 66 kilovolt (kV) from the existing Essential Energy Ulan Switchyard. The 66 kV powerline runs adjacent to the road and rail corridor to the CHPP area where a 66/11 kV substation is located. Power is distributed around the site by overhead cable or underground cable where necessary.

MCM has approval to realign the existing 66 kV powerline along the old Ulan-Wollar Road. This realignment has not been undertaken.

### 2.9.3 Potable Water

Potable water for all facilities is sourced from a combination of rainwater captured from roofs of facilities, suitably treated bore water or imported from external sources. The potable water supply reticulation system services the appropriate areas around the site.

### 2.9.4 Ancillary Infrastructure

The Moolarben Coal Complex is supported by a range of ancillary infrastructure that are periodically relocated, modified or expanded as mining operations progress. Such components include water management features (e.g. bores, pipelines, pumps, drains, contour banks, diversion channels and dams), environmental monitoring equipment, electricity supply, access tracks, equipment such as communication towers, in-pit facilities including bulk fuel handling and personnel crib huts/ablution facilities (amongst other things).

## 2.10 WATER MANAGEMENT

The water management strategy for the Moolarben Coal Complex is based on the containment and re-use of mine water as well as the control of sediment that may be potentially carried with runoff from disturbed areas such as the waste rock emplacements or areas cleared in advance of mining.

The existing water management system at the Moolarben Coal Complex comprises the following:

- water management storages;
- diversion of runoff from catchment areas upslope of the mine disturbance area;
- runoff control on disturbed and rehabilitated areas at the mine;
- runoff control on infrastructure areas;
- sedimentation control;
- water transfer pumps and piping;
- open pit dewatering; and
- sewage treatment and disposal of effluent.

Water is required to operate the Coal Preparation Plant, for washdown of mobile equipment, dust suppression on haul roads and for dust emission control sprays in the ROM and product coal stockpile areas. Water would also be used in the underground mines once developed (e.g. dust suppression). The main water sources for the operation are:

- recovery from coal processing;
- groundwater inflows into the open cut voids;
- catchment runoff (from disturbed areas) and infiltration;
- incidental rainfall over water storages;
- water sharing arrangements with UCML; and
- groundwater extraction from licensed bores.

If stored water volumes are excessive, MCO can release water off-site in accordance with the requirements of Environment Protection Licence (EPL) 12932, subject to stringent release criteria and conditions being met.

The water balance of the system fluctuates with climatic conditions and as the extent of the mining operations changes over time. The water management system is progressively developed as water management requirements evolve in accordance with the approved Water Management Plan.

## 2.11 WASTE MANAGEMENT

MCO waste disposal systems are designed to minimise the amount of waste generated by the mine that goes to landfill.

Waste generated at the Moolarben Coal Complex includes general rubbish, sewage, scrap timber, batteries, tyres, waste oil and filters and other hydrocarbons, empty drums and scrap metals.

Operation of the mining fleet generates waste hydrocarbons such as oils, greases and hydraulic fluids. These waste hydrocarbons are placed in suitable containers and removed from the site for disposal at either an EPA-approved hydrocarbon waste site or a recycling depot.

Treated effluent is discharged in accordance with EPL 12932.

Suppliers are encouraged to supply recyclable products and products that have the capacity for reuse in accordance with the specified 70% waste reduction target.

## 2.12 MANAGEMENT OF DANGEROUS GOODS

The transportation, handling and storage of all dangerous goods at the Moolarben Coal Complex is conducted in accordance with *Storage and Handling of Dangerous Goods – Code of Practice 2005* (Workcover, 2005).

### 2.12.1 Hydrocarbon Storages

A fuel and lubrication store contains above-ground bunded diesel-storage tanks in accordance with the requirements of Australian Standard (AS) 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*.

Runoff water from mobile equipment service areas is directed to an interceptor trap to extract hydrocarbons, prior to it being discharged into the mine water management system. The trap is routinely emptied of hydrocarbons by a licensed contractor.

### 2.12.2 Explosives Storage

Explosives required for the Moolarben Coal Complex include initiating products and detonators, ammonium nitrate fuel oil and emulsion explosives.

Explosives on-site are stored, transported and used in accordance with the requirements of AS 2187.2:2006 *Explosives – Storage, Transport and Use – Use of Explosives*.

## 2.13 WORKFORCE

At full development, the Moolarben Coal Complex has an approved workforce of approximately 439 people. Stage 2 has an approved construction workforce of 220 people.

## 2.14 REHABILITATION

The Mining Operations Plan (MOP) for the Moolarben Coal Complex describes site activities and the progress toward environmental and rehabilitation outcomes required under the ML conditions and the Project Approvals (05\_0117) and (08\_0135).

Rehabilitation of the Moolarben Coal Complex Stage 1 has been undertaken in accordance with the Rehabilitation and Offset Management Plan<sup>2</sup>. To December 2014, approximately 157 hectares (ha) of the backfilled OC1 pit has been rehabilitated in accordance with the Rehabilitation and Offset Management Plan.

Ongoing monitoring and maintenance is undertaken in accordance with the Rehabilitation and Offset Management Plan.

<sup>2</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Biodiversity Management Plan and Rehabilitation Management Plan which will supersede the Landscape Management Plan (including the Rehabilitation and Offset Management Plan).

Rehabilitation of the Moolarben Coal Complex Stage 2 would be undertaken in accordance with a Rehabilitation Management Plan to be prepared for the Moolarben Coal Complex incorporating Stage 2. The proposed Stage 2 rehabilitation strategy is outlined in Appendix K of the Stage 2 PPR.

### 2.14.1 Rehabilitation Objectives

#### **Stage 1 Rehabilitation**

The rehabilitation objectives for Stage 1 of the Moolarben Coal Project are described in the Rehabilitation and Offset Management Plan and are as follows:

- Create a safe, stable, adequately drained post-mining landform that is consistent with the local surrounding landscape within the operational area to minimise visual impacts.
- Rehabilitate the OC1 footprint using native vegetation to create Box Gum Woodlands and Sedimentary Ironbark Forests with stands of *Allocasuarina*.
- Revegetate lands adjoining the northern part of the OC2 area and haul road linkage with OC1 that are under the control of MCO, to enhance vegetation cover and connectivity.
- Enhance Grassy White Box Woodland on basalt soils, in close proximity to Carrs Gap, that are located within the Moolarben Coal Complex Stage 1 application area.
- Improve the ecological integrity of the aquatic habitats through revegetation using native species identified in the Rehabilitation Management Plan.
- Revegetate the riparian zone of the Moolarben Creek to the east of OC3 to improve stream health and enhance the Alluvial Apple Forest.
- Manage the riparian zone of the Bora Creek to improve stream health.
- Rehabilitate mined land to a comparable standard as the relative analogue sites and completion criteria.
- Minimise site access by vehicles which can result in the compaction of soil (which can reduce the infiltration of water into the soil and restrict root growth, and consequently reduce natural regeneration), the spread of weeds and disturbance to vegetation.

- Conduct works associated with UG4 in accordance with an approved Extraction Plan to minimise subsidence impacts on vegetation.
- Protect portions of the lands located above UG4 with an appropriate conservation mechanism for the long-term security of this ecosystem.
- Separate clean and dirty water across the Moolarben Coal Complex Stage 1 application area.
- Promote biodiversity through weed and feral animal control programs.
- Rehabilitate OC2 and OC3 footprints principally for agricultural outcomes.

The OC4 South-West Modification proposes to backfill the northern OC1 final void to approximately pre-mining elevations and revegetate with woodland species.

#### **Stage 2 Rehabilitation**

Rehabilitation of Stage 2 is described in the Stage 2 Moolarben Coal Project Rehabilitation Strategy (MCO, 2011). The specific rehabilitation objectives for Stage 2 are:

- Create a natural looking, stable and well drained post-mining landform that is visually consistent with surrounding areas.
- Create a self-sustaining and ecologically diverse post-mining landscape that is compatible with the conservation values of the adjacent Munghorn Gap Nature Reserve and Goulburn River National Park.
- Revegetate and enhance remnant vegetation on non-mine owned land that is under the control of MCO with endemic native species.
- Create wildlife corridors and habitat links, where feasible, between existing remnant vegetation in the Munghorn Gap Nature Reserve, Goulburn River National Park and other surrounding areas by increasing the continuity of woodland vegetation.
- Maintain the diversity and genetic resource of flora currently existing within the locality.
- Maintain and enhance habitat for native fauna.
- Realign and rehabilitate Murragamba and Eastern creeks to be hydraulically and geomorphologically stable and ecologically diverse.

- Rehabilitate degraded riparian areas along Wilpinjong Creek and along Murragamba and Eastern creeks downstream from mined areas within the Moolarben Coal Complex Stage 2 application area.
- Reinstate subsidiary surface drainage.
- Improve soil condition and native seed bank.
- Prevent soil erosion and sedimentation.
- Provide access for monitoring and adaptive management, control of exotic flora and fauna species and suppression of fires.
- Progress towards meeting closure and post-mining land use objectives (to be developed in consultation with stakeholders and described in a Mine Closure Plan) in a timely and cost effective manner.

#### 2.14.2 Rehabilitation Monitoring

In accordance with the MOP and Rehabilitation and Offset Management Plan, MCO currently conducts annual Ecosystem Function Analysis (EFA) monitoring and reporting which comprises:

- Landscape Function Analysis;
- Landscape Organisation Index;
- Soil Surface Assessment (producing stability, infiltration and nutrient indices); and
- Vegetation Dynamics (for woodland areas).

The EFA is used to assess the progress of rehabilitation sites against relevant reference sites located outside the disturbance footprint and is used to assess whether rehabilitation areas are satisfying rehabilitation objectives and are on a trajectory toward self-sustainability. Rehabilitation monitoring results are reported in the Annual Review.

#### 2.15 ENVIRONMENTAL MANAGEMENT AND MONITORING

Environmental management and monitoring at the Moolarben Coal Complex is conducted in accordance with a range of plans required by Project Approvals (05\_0117 and 08\_0135) and EPBC 2013/6926. Following the approval of Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project, the following environmental management plans are required under the state and federal approvals for the Moolarben Coal Complex<sup>3</sup>:

- Environmental Management Strategy.
- Noise Management Plan.
- Blast Management Plan.
- Air Quality Management Plan.
- Water Management Plan (including Site Water Balance, Surface Water Management Plan and Groundwater Management Plan).
- Biodiversity Management Plan.
- Heritage Management Plan.
- Rehabilitation Management Plan.
- Extraction Plan(s).
- Greenhouse Gas Minimisation Plan.
- Vegetation Clearance Protocol and Landscape Management Plan.
- Biodiversity Offset Management Plan.

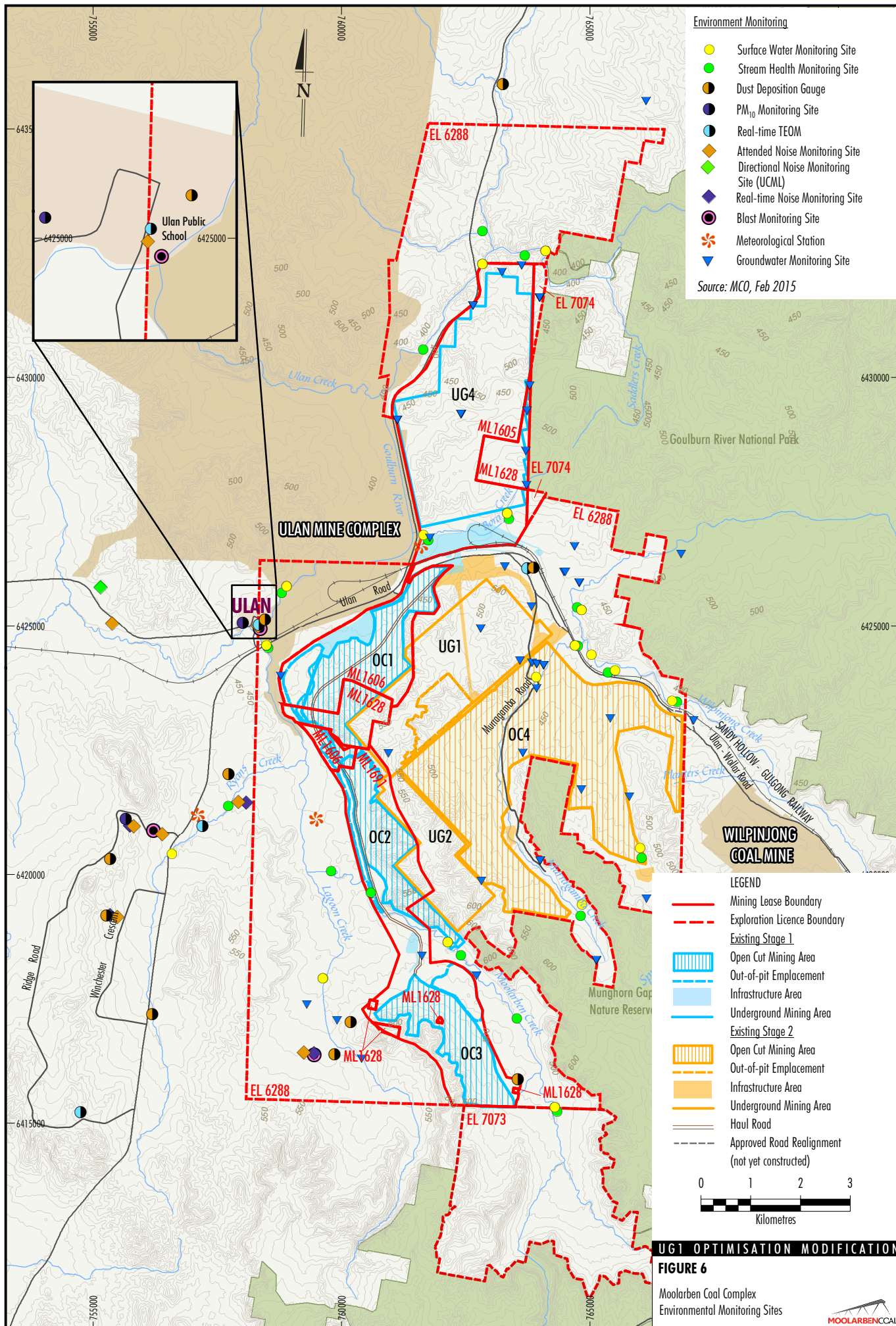
The Moolarben Coal Complex has an extensive environmental monitoring regime. Environmental monitoring locations are shown on Figure 6.

#### 2.16 COMMUNITY CONTRIBUTIONS

MCO financial contributions to the MWRC are made in accordance with Moolarben Coal Complex Planning Agreements, Project Approval (05\_0117) and Project Approval (08\_0135).

UCML, WCPL, MCO and MWRC are also co-funding implementation of the Ulan Road Strategy that will result in significant upgrades to Ulan Road.

<sup>3</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing complex-wide environmental management plans.



MCO also makes financial contributions to a number of non-Government and community organisations in the region. MCO financial contributions (in the form of sponsorships and donations) to various education, community development, health, environmental, arts, culture, and youth services in the region in the 2014 calendar year has totalled approximately \$215,000.

Examples of recent financial contributions have included support for the following groups:

- Moolarben Coal Celebrity Golf Classic (charity event);
- Mudgee District Hospital;
- Ulan Public School;
- Mudgee Scouts;
- Lifeskills Plus Mudgee;
- Mudgee Police Cup;
- Mudgee Chamber of Commerce;
- Rotary Club Mudgee Sunrise;
- Cooks Gap Bushfire Brigade;
- Cudgegong Cruiser;
- Gulgong Cricket;
- Arts Council Gulgong;
- Australian Breastfeeding Mudgee Group;
- Mudgee Public School;
- Mudgee Region Dragon Boats;
- Rylstone Show Society;
- Gulgong Golf Club;
- Mudgee Valley Writers;
- Merriwa Tennis Club;
- Pioneer House Nursing Home;
- Mudgee Little Athletics;
- Gulgong Country Women's Association;
- Rotary Club Mudgee Sunrise;
- Henry Lawson Festival;
- Mid-Western Dance Festival;
- Mudgee Junior Rugby;
- Rylstone/Kandos Rescue;
- Mudgee Dragons Rugby League;
- Gulgong Fishing Club;
- Sculptures in the Gardens;
- Mudgee Readers;
- Mudgee Bowling Club;
- Cooyal Tennis Club;
- Gulgong Pre School;
- North West Falcons Ladies Soccer;
- Gulgong Aviculture;
- Mudgee Men's Shed;
- Mudgee Triathlon Club;
- Mudgee Tennis Club;
- Kandos Public School;
- Eurunderee Provisional School;
- Pioneer House Nursing Home;
- Country Women's Association Mudgee;
- Hargraves Public School;
- Gulgong High School;
- Gulgong Folk Club;
- Mudgee Fine Foods;
- Mudgee Public School;
- Mudgee Junior Cricket;
- Mudgee District Cricket;
- Vision Australia Mudgee;
- Dunedoo Lions Club;
- Turill Community Committee;
- Gulgong Hostel; and
- Gulgong Pony Club.

## 2.17 COMPLAINTS

In accordance with the requirements of the Environmental Management Strategy, MCO records and responds to all complaints and provides a complaints register summary in the Annual Review each year.

In the 2013-2014 reporting period, a total of 256 complaints were received (MCO, 2015) from some 33 complainants with 37% of the complaints coming from a single resident. The majority of complaints (92%) were related to noise impacts associated with the open cut mining operations.

Mine-related complaints are managed in accordance with the Community Complaints Procedure as outlined in the Environmental Management Strategy.

### 3 DESCRIPTION OF THE PROPOSED MODIFICATION

Following a review of mine planning, MCO has identified opportunities to extract additional economically viable coal and improve underground mining and processing efficiencies associated with the underground operations at the Moolarben Coal Complex, namely UG1.

#### 3.1 UNDERGROUND MINING OPERATIONS

##### *Underground Mining Area Layout*

The proposed layout of the UG1 Optimisation Modification is shown on Figure 4. Main headings would be developed to the north-east of the UG1 longwall panels and the previously approved central mains would be mined reducing the number of longwall panels (and associated longwall mining equipment relocations) from nine to five.

The UG1 longwall panels would be lengthened in the north-east by approximately 150 to 500 m. The southern two UG1 longwall panels would be lengthened in the south-west by approximately 75 m (Figure 4).

The UG1 Optimisation Modification would increase the longwall panel width from approximately 305 to 311 m. The longwall chain pillar widths would reduce from approximately 30 to 20 m. The coal seam extraction thickness would increase by approximately 300 mm resulting in a maximum extraction thickness of 3.5 m.

The extended UG1 longwall panels would be set back approximately 250 m from the Gulgong-Sandy Hollow Railway Line.

A subsidence assessment has been undertaken by Mine Subsidence Engineering Consultants (MSEC) and is provided in Appendix A. Plans showing the changes to the UG1 longwall panel layout as a result of the UG1 Optimisation Modification are shown in the Subsidence Assessment (Appendix A).

There would be no change to the UG2 and UG4 longwall panel layouts as a result of the UG1 Optimisation Modification.

##### *Mine Access and Development Works*

There would be no change to the approved access to UG1 via the OC1 highwall as a result of the UG1 Optimisation Modification (Section 2.4). The access headings to the UG1 north-east mains would be driven along the northern panel of UG1 (Figure 4).

Access to UG2 and UG4 would be via the UG1 north-east main headings as shown on Figure 4.

##### *Longwall Mining Operations*

Longwall mining operations would commence at the south-western end of the five UG1 longwall panels and move towards the north-east.

Approximately 3.7 Mt of additional ROM coal would be recovered from UG1. ROM coal extraction would occur at a rate of up to 8 Mtpa.

First workings of the UG1 panels are proposed to commence in late 2015 with longwall extraction to commence in approximately 2017.

Consistent with the approved operations, underground mining operations would be conducted 24 hours a day, 7 days a week.

##### *Major Underground Equipment*

Consistent with the approved operations, the UG1 panels would be extracted by a longwall mining machine. Improvements to longwall mining equipment since lodgement of the Stage 2 EA would allow ROM coal recovery to be undertaken at a rate of up to 8 Mtpa and at a maximum extraction thickness of 3.5 m.

##### *Ventilation Systems*

Ventilation for the UG1 Optimisation Modification would comprise:

- upcast and downcast shafts and associated fan at the Remote Services Facilities in the north-east of the UG1 longwall panels; and
- downcast rear air intake shaft and associated fan in the south-west of the UG1 longwall panels.

The final location of the upcast and downcast shafts within the Remote Services Facility area would be described in the Mining Operations Plan and would be subject to detailed design and consideration of local geological features. The rear air intake shaft is discussed further in Section 3.5.3.

Underground gas generation would be monitored and managed in accordance with the Extraction Plan and Greenhouse Gas Minimisation Plan to be prepared for the Moolarben Coal Complex.

### **Advance Dewatering**

It is expected that the open cut mining adjacent to UG1 would have largely depressurised and dewatered the Ulan Seam prior to underground mining. Where advance dewatering is required in the underground mining areas, bores would be established to pump water to the surface in accordance with the Water Management Plan.

### **3.2 OPEN CUT MINING OPERATIONS**

There would be no change to the approved open cut mining methods, maximum production rates, fleet or waste rock management as a result of the UG1 Optimisation Modification (Section 2.3).

Open cut mining activities at the Moolarben Coal Complex would continue to occur 24 hours a day, 7 days a week.

### **3.3 PRODUCT COAL TRANSPORT**

As a component of the UG1 Optimisation Modification, transport of product coal via rail would increase up to 18 Mtpa (i.e. 10 Mtpa from open cut operations and 8 Mtpa from underground operations). The Moolarben Coal Complex incorporating the UG1 Optimisation Modification would require an average of seven product coal train departures per day. A peak of nine train departures per day would be required during periods to meet cargo assembly timeframes at the Port of Newcastle.

No changes to existing rail transport routes are proposed for the UG1 Optimisation Modification.

### **3.4 COAL HANDLING AND PREPARATION INFRASTRUCTURE**

The Moolarben Coal Complex incorporating the UG1 Optimisation Modification would handle up to 21 Mtpa of ROM coal (total) (i.e. 13 Mtpa from open cut operations and 8 Mtpa from underground operations).

#### **3.4.1 Underground Coal Handling**

The UG1 Optimisation Modification would include the construction of conveyors between the OC1 highwall access and product coal stockpiles to transfer underground ROM coal (Figure 4). Coal exiting the underground area at the OC1 highwall would be transferred to a new stockpile with a capacity of approximately 370,000 t at the UG1 pit top facilities (Figure 4). Underground coal would then be reclaimed by up to two dozers onto a second conveyor and transferred to a new sizing station and finally to the product coal bypass stockpile in the CHPP area (Figure 4). Noise impacts associated with the proposed conveyors, sizing station and dozers has been assessed by SLR Consulting and are presented in Appendix C and summarised in Section 4.3.

In exceptional circumstances (including unexpected events such as significant disruption to conveyors), underground coal may be trucked via internal haul road to the Stage 1 ROM pad (Figure 3) prior to transfer to the CHPP area.

An extension to the approved underground coal product stockpile (Figure 4) would increase the capacity to approximately 400,000 t.

#### **3.4.2 Coal Preparation Plant**

The UG1 Optimisation Modification would not require any changes to the Coal Preparation Plant.

### **3.5 GENERAL INFRASTRUCTURE**

#### **3.5.1 Underground Mine Infrastructure Area**

The underground Mine Infrastructure Area within the OC1 pit would be relocated and would include:

- offices;
- bathhouse (including sewage treatment plant) and crib rooms;
- hardstand and laydown areas;
- workshop and stores;
- hydrocarbon storage;
- communications, power and water reticulation infrastructure; and
- parking facilities.



The underground Mine Infrastructure Area would be constructed wholly within existing/approved disturbance areas (Figure 4).

### 3.5.2 Remote Services Facilities

Remote Services Facilities would be constructed above the UG1 north-east mains and would include (among other things):

- UG1 main headings services (connected to the main headings via a vertical drophole);
- upcast ventilation and downcast ventilation shafts and associated fan (Section 3.1);
- pressure balance chambers;
- access roads, hardstand and laydown areas;
- high voltage and other electrical infrastructure;
- temporary and permanent surface water drainage infrastructure; and
- dewatering bores and associated pipelines.

Access to the Remote Services Facilities would be via the approved site access from Ulan-Wollar Road that is yet to be constructed.

### 3.5.3 Rear Air Intake Shaft

A rear air intake shaft and associated fan would be constructed above the south-western end of the UG1 panels as described in Section 3.1.

Subject to the final detailed design, if the rear air intake shaft and related surface infrastructure was to be positioned in a materially different location within UG1, supplementary specialist environmental assessment studies would be prepared. These studies and any associated management measures would be detailed in an Air Intake Shaft Management Plan.

The Air Intake Shaft Management Plan would be prepared to the satisfaction of the Secretary of the DP&E and would include:

- Targeted visual impact assessment, and where required, implementation of management measures to minimise visual impacts at nearby affected receiver.

- A Vegetation Management Protocol that minimises any potential disturbance of natural vegetation. Surveys would be conducted of potential drainage sites for threatened flora species and endangered ecological communities (EECs). If any threatened flora species are identified, the proposed drainage site would be relocated so as to avoid any associated impacts.
- Design of erosion and sediment control and site water management measures in accordance with applicable guidelines.
- Site-specific Aboriginal and non-Aboriginal heritage inspections, and if required, relocation of the proposed drainage sites so as to avoid known Aboriginal and non-Aboriginal heritage sites.

## 3.6 WATER MANAGEMENT

The UG1 Optimisation Modification would not include any significant change to the water management system, water supply or water demand described in Section 2.10.

There would be minor changes to the site water balance associated with increased underground mine water demand associated with the higher coal production rate and increased groundwater inflows from the porous rock aquifer (Ulan Seam) to UG1 associated with the extended longwalls (Appendix B).

A review of the site water balance of the Moolarben Coal Complex incorporating the UG1 Optimisation Modification was conducted by WRM Water & Environment (2015) (Appendix F). WRM Water & Environment concluded that the changes to site water balance would be small in comparison to the approved Moolarben Coal Complex and would be adequately managed under the existing surface water management system (Section 2.10).

Surface water runoff from the proposed Remote Services Facilities would be captured in a small sediment dam that would be constructed for the UG1 Optimisation Modification (Appendix F). Other infrastructure proposed under the UG1 Optimisation Modification would be managed under the existing site water management system with minor upgrades where necessary.

MCO would continue to undertake regular reviews of the site water balance. If stored water volume falls, MCO can implement sourcing of water through sharing arrangements with adjoining mines and/or from licensed water supply bores. If stored water volumes are excessive, MCO can release water off-site in accordance with the requirements of EPL 12932, subject to stringent release criteria and conditions being met.

### 3.7 WASTE MANAGEMENT

The UG1 Optimisation Modification would not change the existing waste streams (Section 2.11) and accordingly, no changes to existing waste management practices at the Moolarben Coal Complex would be required.

### 3.8 MANAGEMENT OF DANGEROUS GOODS

The UG1 Optimisation Modification would not change the dangerous goods handled at the Moolarben Coal Complex (Section 2.12) and accordingly, no changes to the management of dangerous goods (e.g. hydrocarbons, explosives and chemicals) would be required.

### 3.9 WORKFORCE

The UG1 Optimisation Modification seeks an increase in the approved Moolarben Coal Complex construction and operational workforces to incorporate anticipated personnel for the approved underground and open cut operations.

The construction period associated with the UG1 Optimisation Modification is anticipated to occur during 2016 and 2017. The average construction workforce (i.e. 120 personnel) is below the approved Moolarben Coal Complex construction workforce (i.e. 220 personnel). The UG1 Optimisation Modification seeks to increase the peak construction workforce to 250 personnel for the Moolarben Coal Complex, with the peak expected to occur for a short period (2 months) during 2017.

The UG1 Optimisation Modification seeks to increase the approved operational workforce for the Moolarben Coal Complex from approximately 439 personnel to approximately 667 personnel on average. A peak operational workforce of 740 personnel would be required for 12 to 18 months during 2016 and 2017.

### 3.10 CONSTRUCTION ACTIVITIES

The construction of the Remote Services Facilities, underground Mine Infrastructure Area, conveyors and power supply line would be undertaken during 2016 and 2017 or when all relevant approvals are in place. Construction activities would generally be restricted to daytime hours (i.e. 7.00 am to 6.00 pm) up to 7 days per week.

The construction of the power supply line between the CHPP and underground Mine Infrastructure Area would be undertaken by a licensed electrical contractor in consultation with MCO.

Potential noise impacts associated with the proposed construction activities have been assessed by SLR Consulting (Appendix C).

### 3.11 REHABILITATION

The approved rehabilitation objectives and concepts would remain generally unchanged for the UG1 Optimisation Modification. Notwithstanding, a Rehabilitation Management Plan and MOP would be prepared to incorporate the UG1 Optimisation Modification.

Following the completion of mining operations on-site, the Remote Services Facilities, underground Mine Infrastructure Area, rear air intake shaft and proposed coal conveyors would be decommissioned and rehabilitated.

The rehabilitation objectives for the proposed underground Mine Infrastructure Area and coal conveyors would be consistent with other Stage 1 areas (Section 2.14.1).

The rehabilitation objectives for the proposed Remote Services Facilities and rear air intake shaft would be consistent with other Stage 2 areas (Section 2.14.2).

## 4 ENVIRONMENTAL ASSESSMENT

The following sub-sections present the environmental assessment for the UG1 Optimisation Modification, including a description of the existing environment, an assessment of the potential impacts of the UG1 Optimisation Modification on the environment; and where relevant, a description of the measures that would be implemented to avoid, minimise, mitigate and/or offset the potential impacts.

### 4.1 SUBSIDENCE

Subsidence is the vertical and horizontal movement of the land surface as a result of the extraction of underlying coal. These land surface movements are generically referred to as subsidence effects. The type and magnitude of the subsidence effects is dependent on a range of variables (e.g. mine geometry, topography and geology).

The approved underground mines at the Moolarben Coal Complex have not yet been developed.

The existing Project Approvals (05\_0117) and (08\_0135) require MCO to prepare an Extraction Plan for second workings prior to extraction.

#### 4.1.1 Environmental Review

A detailed Subsidence Assessment has been prepared for the UG1 Optimisation Modification by Mine Subsidence Engineering Consultants (MSEC) and is presented in Appendix A.

The subsidence assessment:

- provides subsidence predictions for the modified UG1 mine layout;
- compares the subsidence predictions with those previously provided in the Stage 2 PPR for the approved UG1 mine layout (MSEC, 2011);
- identifies the natural and built features located within the extent of UG1 subsidence; and
- provides subsidence predictions and impact assessments, in conjunction with other specialist consultants, for these natural and built features.

The extent of UG1 subsidence is defined as the area enclosed by a 26.5 degree angle of draw line from the limit of proposed mining and by the predicted 20 mm subsidence contour resulting from the extraction of the modified UG1 longwall layout (Appendix A).

#### *Prediction Methodology*

Predictions of the systematic subsidence parameters for the modified UG1 mine layout were made using the Incremental Profile Method, which consists of subsidence prediction curves based on monitoring data from mines extracting coal from the Southern, Newcastle, Hunter and Western Coalfields of NSW (Appendix A).

The Incremental Profile Method has a tendency to over predict systematic subsidence parameters where the proposed mining geometry and geology are within the range of the empirical database (i.e. the method is based on upper bound curves and is generally conservative) (Appendix A).

Appendix A provides a more detailed description of the subsidence prediction methodologies.

#### *Predicted Subsidence Effects*

Subsidence effects are the deformation of the ground mass due to underground mining, including all mining-induced ground movements.

Systematic subsidence movements are described by the following parameters: vertical subsidence, tilt, curvature, and associated strains (tensile and compressive strains).

Table 2 presents a comparison of the predicted cumulative subsidence effects from the approved and modified UG1 mine layout.

The maximum predicted total vertical subsidence for the modified UG1 mine layout is slightly greater (i.e. approximately 40 cm) than previously predicted subsidence for the approved UG1 layout (Appendix A). The increase in the maximum total vertical subsidence is mostly due to the increase in the maximum seam extraction thickness from 3.2 m to 3.5 m, while a smaller influence is from the increased panel width to depth ratios and reduced pillar width to depth ratios (Appendix A).

**Table 2**  
**Comparison of Predicted Systematic Subsidence Effects for the Approved and Modified Mining Layouts**

Layout	Maximum Predicted Total Subsidence (mm)	Maximum Predicted Total Tilt (mm/m)	Maximum Predicted Hogging Curvature (km <sup>-1</sup> )	Maximum Predicted Sagging Curvature (km <sup>-1</sup> )
Approved UG1 Mine Layout	1,980	95	>5	<-5
Proposed Modified UG1 Mine Layout	2,380	115	>5	<-5

Source: Appendix A.  
 mm = millimetre.  
 mm/m = millimetre per metre.  
 km<sup>-1</sup> = per kilometre.

The maximum predicted total tilt, hogging curvature and sagging curvature and predicted strains for the modified UG1 mine layout are similar to those previously predicted for the approved UG1 layout (Appendix A).

### ***Subsidence Impacts***

Subsidence impacts are the physical changes to the ground and its surface caused by the subsidence effects described above. Potential subsidence impacts associated with the UG1 include:

- surface cracking;
- changes in stream bed gradients;
- ponding and changes in stream alignment;
- slope instability and erosion; and
- depressurisation of groundwater aquifers.

### ***Potential Environmental Consequences on Key Natural and Built Features***

The modified UG1 mine layout has been designed to be consistent with the subsidence impact performance measures in the existing Stage 2 Project Approval (08\_0135) where relevant to UG1 (Table 3).

A summary of the potential consequences of the potential subsidence impacts above the modified UG1 mine layout is provided below, including cross-references to sub-sections with further detail.

#### ***Drainage Lines***

Murrumbidgee Creek and Wilpinjong Creek are located outside the angle of draw and extent of predicted measurable vertical subsidence associated with UG1 (Figure 7).

A number of minor unnamed drainage lines overlie the UG1 mine layout in relatively steep topography. These drainage lines have been designated Drainage Line (DL) 4, DL5, DL6 and DL7 on Figure 7. There are no drainage lines located above the underground mining area extensions.

Two of these drainage lines (DL4 and DL5) are located within the extent of the approved OC4 out-of-pit emplacement (Figure 7) and would be covered with waste rock prior to subsidence occurring as a result of UG1.

Potential impacts to drainage lines DL6 and DL7 are discussed in Section 4.6 and Appendix F.

#### ***Cliffs C7, C9 and C10***

Cliffs C7, C9 and C10 are located outside of the extent of UG1 subsidence and are therefore not expected to experience any additional measurable tilts, curvatures or strains as a result of the UG1 Optimisation Modification.

Therefore, the UG1 Optimisation Modification is expected to be consistent with the subsidence impact performance measure of 'negligible environmental consequences' for Cliffs C7, C9 and C10.

#### ***Other Cliffs***

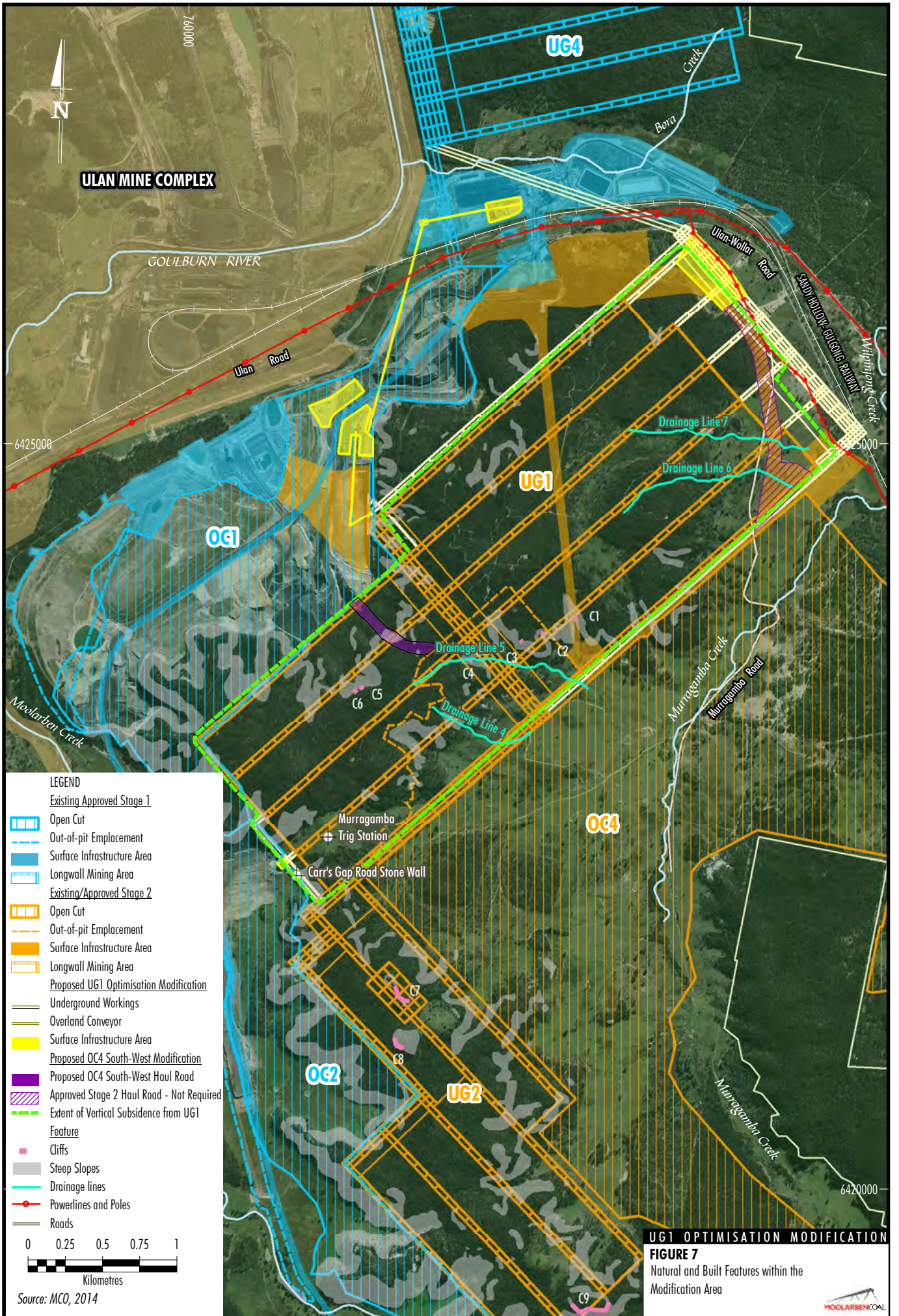
There are six cliffs (C1 – C6) located within the extent of UG1 subsidence (Figure 7). There are no cliffs above the underground mining area extensions.

Three of these cliffs (C2, C3 and C4) are located within the extent of the approved OC4 out-of-pit emplacement (Figure 7) and would be covered with waste rock prior to subsidence occurring as a result of UG1. Cliff C1 is located within the extent of disturbance for an approved conveyor.

**Table 3**  
**Subsidence Impact Performance Measures**

<b>Feature</b>	<b>Subsidence Impact Performance Measure</b>
Drainage Lines (DL1 – DL7)	No greater subsidence impacts or environmental consequences than predicted in the EA.
Cliffs C7, C9 and C10 (located above UG2)	Negligible environmental consequences (that is occasional rockfalls, displacement or dislodgement of boulders or slabs or fracturing, that in total do not impact more than 0.5% of the total face of such cliffs within any longwall mining domain).
Other cliffs	No greater subsidence impacts or environmental consequences than predicted in the EA.
Minor cliffs Rock face features Steep slopes	Minor environmental consequences (that is, occasional rockfalls, displacement of or dislodgment of boulders or slabs, or fracturing, that in total do not impact more than 5% of the total face area of each such type of feature within any longwall mining domain).
Threatened species, threatened populations, or endangered ecological communities	Negligible subsidence impacts or environmental consequences.
Aboriginal heritage site S2MC 236 (located above UG2)	Negligible subsidence impacts or environmental consequences.
Historic heritage sites	No greater subsidence impact or environmental consequences than predicted in the EA.
First workings under an approved Extraction Plan beneath any feature where performance measures in this table require negligible subsidence impacts or negligible environmental consequences	To remain long-term stable and non-subsiding.
Second workings	To be carried out only in accordance with an approved Extraction Plan.
Gulgong-Sandy Hollow Railway Line	Always safe and serviceable. Damage that does not affect safety or serviceability must be fully repairable, and must be fully repaired.
Murragamba Road Low voltage electricity powerline	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.
Telecommunication cable Fibre-optic cable Murragamba Trig Station	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.
Other built features and improvements, including fences	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.
Public safety	Negligible additional risk.

Source: Conditions 1 and 3, Schedule 4, Moolarben Coal Project Stage 2 Project Approval 08\_0135 (Attachment 2).



**ULAN MINE COMPLEX**

**LEGEND**

Existing Approved Stage 1

- Open Cut
- Out-of-pit Emplacement
- Surface Infrastructure Area
- Longwall Mining Area

Existing/Approved Stage 2

- Open Cut
- Out-of-pit Emplacement
- Surface Infrastructure Area
- Longwall Mining Area

Proposed UG1 Optimisation Modification

- Underground Workings
- Overland Conveyor
- Surface Infrastructure Area

Proposed OC4 South-West Modification

- Proposed OC4 South-West Haul Road
- Approved Stage 2 Haul Road - Not Required

Extent of Vertical Subsidence from UG1

- Feature

Feature

- Cliffs
- Steep Slopes
- Drainage lines
- Powerlines and Poles
- Roads

0 0.25 0.5 0.75 1  
Kilometres

Source: MCO, 2014

**UG1 OPTIMISATION MODIFICATION**  
**FIGURE 7**  
 Natural and Built Features within the Modification Area



Consistent with the predictions in the Stage 2 PPR, Cliffs C1, C5 and C6 are expected to experience minor impacts (Appendix A). Therefore, the UG1 Optimisation Modification is expected to be consistent with the subsidence impact performance measure of 'no greater subsidence impacts or environmental consequences than predicted in the EA' for other cliffs.

#### *Steep Slopes and Rock Face Features*

The locations of the natural steep slopes within the extent of UG1 subsidence are shown on Figure 7. There are small sections of steep slopes above the south-western underground mining area extension.

The impacts predicted for steep slopes and rock face features are generally consistent with the approved Moolarben Coal Complex and therefore there would be no change in the environmental consequence as a result of the UG1 Optimisation Modification.

#### *Threatened Species, Threatened Populations and Endangered Ecological Communities*

Potential consequences on threatened species, threatened populations and endangered ecological communities as a result of subsidence impacts are discussed in Section 4.5 and Appendix E.

#### *Aboriginal Cultural Heritage*

A number of Aboriginal cultural heritage items, including artefact scatters and isolated finds have been identified within the extent of UG1 subsidence. Potential consequences on Aboriginal cultural heritage items as a result of subsidence impacts are described in Section 4.7 and Appendix G.

#### *Non-Aboriginal Cultural Heritage*

The Carrs Gap Road stone wall heritage site is located within the extent of UG1 subsidence (Figure 7). Potential consequences on this site as a result of subsidence are discussed in Section 4.11.3.

#### *Groundwater Resources*

Potential impacts on alluvial aquifers and groundwater are described in Section 4.2 and Appendix B.

#### *Land Use and Land Resources*

Potential consequences on land resources and land use as a result of subsidence impacts are described in Section 4.11.1.

#### *Key Built Features*

The following key built features are located within the vicinity of UG1 (Figure 7):

- Gulgong-Sandy Hollow Railway line;
- Murragamba Road;
- Ulan-Wollar Road;
- electricity transmission lines;
- copper telecommunication cables; and
- Murragamba Trig station.

The Gulgong to Sandy Hollow Railway Line varies from approximately 255 m to 400 m from the nearest edges of the modified UG1 mine layout (compared to 330 m for the approved UG1 mine layout). The modified UG1 mine layout would be unlikely to adversely impact on the Gulgong-Sandy Hollow Railway line (Appendix A) and is therefore expected to be consistent with the subsidence impact performance measure requiring the Gulgong-Sandy Hollow Railway line to remain 'safe and serviceable'.

Murragamba Road is currently subject to a road closure application and will no longer be in use when subject to subsidence from UG1. An alternative access point from Ulan-Wollar Road has been approved as part of the Moolarben Coal Project Stage 2. This will provide access to OC4 and Murragamba Creek valley and would not be subject to subsidence impacts from the modified UG1 mine layout.

Ulan-Wollar Road is located outside the extent of UG1 subsidence and would be unlikely to be adversely impacted.

A 66kV powerline is located along the Ulan-Wollar Road and within 110 m of the modified UG1 mine layout. The powerline would only experience low systematic subsidence movements of less than 20 mm and very low tilts and strains (Appendix A).

A low voltage electricity powerline that previously provided power to Murragamba Creek valley has been decommissioned. The main underground copper telecommunications cables within the extent of UG1 subsidence are no longer in service.

The Murragamba Trig Station is located above the approved and modified UG1 mine layout. Consistent with the predictions in the Stage 2 PPR, it is anticipated there would be no significant impact on the survey mark itself, however it would be necessary on the completion of subsidence to re-establish the exact location of the Trig Station (Appendix A).

### *Other Built Features and Improvements*

Potential subsidence impacts on other built features and improvements (e.g. farm dams and fences) are presented in Appendix A.

### *Public Safety*

Surface cracking, erosion and ponding have the potential to pose a safety hazard to persons undertaking authorised access (e.g. MCO personnel and contractors) and unauthorised access of active subsidence areas.

MCO would implement the Public Safety Management Plan required for the Extraction Plan so that there would be no additional risk to public safety.

#### **4.1.2 Mitigation Measures, Management and Monitoring**

An Extraction Plan is required to be prepared prior to the commencement of second workings to:

- demonstrate that the subsidence impact performance measures (Table 3) can be achieved; and
- develop detailed mitigation measures and monitoring to manage the potential impacts and/or environmental consequences on natural and built features.

Mitigation measures and management for potential consequences on groundwater, ecology, surface water, Aboriginal cultural heritage and land resources, are described in Sections 4.2, 4.5, 4.6, 4.7 and 4.11.1.

### *Built Features*

Measures to manage the impacts of subsidence on built features would be developed as a component of the relevant Extraction Plan for consideration and approval by the relevant authorities, and would be consistent with the requirements of the Stage 2 Project Approval (08\_0135).

### *Public Safety*

The Extraction Plan for UG1 would include a Public Safety Management Plan as required under Condition 5, Schedule 4 of the Stage 2 Project Approval (08\_0135). The Public Safety Management Plan would include measures to maintain public safety (e.g. regular monitoring and remediation of surface cracking).

## **4.2 GROUNDWATER RESOURCES**

A Groundwater Assessment for the Moolarben Coal Complex incorporating the UG1 Optimisation Modification has been prepared by Dundon Consulting (2015), with supporting groundwater modelling undertaken by HydroSimulations (2015). These reports are presented in Appendix B.

The latest version of the approved RPS Aquaterra model (2012) for the Moolarben Coal Complex was used for the UG1 Optimisation Modification to ensure consistency of predictions (Appendix B).

### **4.2.1 Background**

A number of groundwater investigations, assessments and reviews have been undertaken since 2006 to assess the potential impacts of the approved Moolarben Coal Complex. Recent groundwater assessments undertaken for the approved Moolarben Coal Complex include:

- Moolarben Coal Complex Stage 2 PPR Groundwater Impact Assessment November 2011 (RPS Aquaterra, 2011);
- Moolarben Coal Project Stage 1 Optimisation Modification Groundwater Assessment (AGE, 2013); and
- Moolarben Coal Complex Stage 2 PPR Response to Submissions Additional Groundwater Impact Assessment (RPS Aquaterra, 2012).

RPS Aquaterra (2011) predicted that drawdown impacts on privately-owned bores from the approved Moolarben Coal Complex would not exceed 0.6 m and therefore would have negligible effect on groundwater users.

Groundwater monitoring and management at the Moolarben Coal Complex is conducted in accordance with the Water Management Plan, including the approved Surface and Ground Water Response Plan<sup>4</sup>.

The Moolarben Coal Complex groundwater monitoring sites are shown on Figure 6.

<sup>4</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Water Management Plan.



### **Hydrogeological Regime**

The Moolarben Coal Complex area is located in the Western Coalfields on the north western edge of the Sydney-Gunnedah Basin, which contains sedimentary rocks, including coal measures, of Permian and Triassic age. The dominant outcropping lithologies over the Moolarben Coal Complex are the Triassic Narrabeen Group (Wollar Sandstone) and the Permian Illawarra Coal Measures. The siltstones and sandstones of the Triassic Narrabeen Group form elevated, mesa-like incised plateaus associated with the Goulburn River National Park and the Munghorn Gap Nature Reserve.

#### *Alluvial Aquifers*

Quaternary alluvial deposits in the vicinity of the Moolarben Coal Complex are associated with Lagoon Creek, Goulburn River, Moolarben Creek and Wilpinjong Creek (Appendix B).

There is no 'highly productive' groundwater, as defined under the Aquifer Interference Policy, mapped in the vicinity of the Moolarben Coal Complex (Appendix B). The nearest 'highly productive' groundwater is a portion of the alluvial aquifer associated with Wilpinjong Creek downstream of the Wilpinjong Coal Mine (Appendix B).

#### *Tertiary Palaeochannel Deposits*

Tertiary palaeochannel deposits have been recognised in the Goulburn River diversion (at Ulan) and in the Murrumbidgee and Wilpinjong creek valleys, with a maximum thickness of 40 m to 50 m. Palaeochannels are remnants of inactive river or stream channels that have been later filled in or buried by younger sediment that can be stronger or weaker than the original strata (Appendix A). The infill sediments consist of poorly-sorted semi-consolidated quartzose sands and gravels in a clayey matrix (Appendix B).

A Transient Electro-Magnetic (TEM) and Direct Current (DC) electrical resistivity survey program has been conducted to better define the depth of regolith and the extent of the palaeochannel to the north-east of UG1 (Appendix B). HydroSimulations (Appendix B) has determined the modified UG1 mine layout would not pass beneath any water bearing palaeochannel sediments.

### *Porous Rock Aquifers*

The porous rock aquifers consist of the Narrabeen Group sandstones and the Illawarra Coal Measures, consisting of coal seams, conglomerate, mudstones and siltstones (Appendix B).

None of the identified groundwater systems are significant aquifers (Appendix B). The most permeable units are the Ulan Seam and Marrangaroo Conglomerate, while the sandstones of the Narrabeen Group are of lower permeability and are elevated above the Moolarben Coal Complex. The Illawarra Coal Measures also include low permeability mudstones and siltstones (Appendix B).

Recharge to the groundwater systems would occur primarily from direct rainfall and runoff infiltration. The Permian and Triassic aquifers in the vicinity of the Moolarben Coal Complex are primarily recharged at outcrops. Where the Triassic and/or Permian is overlain by alluvium, colluvium or highly weathered bedrock, additional recharge may also occur from these unconsolidated surficial materials.

There are no high priority culturally significant sites listed in the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. However, a spring known as *The Drip* is a groundwater dependent ecosystem with some local cultural significance. This water feature is likely to be fed from perched water in the Wollar Sandstone (Appendix B).

### **4.2.2 Environmental Review**

The key findings of the Groundwater Assessment (Appendix B) are:

- The UG1 Optimisation Modification would have no material impact on stream baseflow or natural river leakage for any nearby stream. The Modification is predicted to cause minor reductions in the volume of baseflow discharged to Wilpinjong Creek (north of the confluence with Murrumbidgee Creek) of less than 1 megalitre per year (ML/year), with natural gaining conditions predicted to persist.
- The UG1 Optimisation Modification would cause negligible drawdown in alluvial aquifers.
- Up to 6.5 metres of additional drawdown is predicted in the Ulan Seam in the north-eastern extents of UG1, which is minor from a regional perspective.
- There would be no other discernible change in drawdown resulting from the UG1 Optimisation Modification.

- No third-party groundwater users would be affected by the UG1 Optimisation Modification, in terms of the minimal harm considerations of the Aquifer Interference Policy.
- The net loss of groundwater from the alluvium to underlying rock strata associated with the UG1 Optimisation Modification is expected to be negligible.

### **Groundwater Inflows**

The UG1 Optimisation Modification would not increase peak inflow rates predicted for the approved Moolarben Coal Complex and would contribute less than approximately 0.2 megalitres per day (ML/day) to inflow rates during mining of UG1 (Appendix B).

### **Groundwater Licensing**

There is negligible change in licensing requirements at the Moolarben Coal Complex in the Wollar Creek and Upper Goulburn River Water Sources regulated under the *Water Management Act, 2000* (Appendix B).

The Groundwater Assessment predicted an increase in peak water inflows to UG1 from the porous rock groundwater source (which is regulated under the *Water Act 1912*) of 69 ML/year as a result of the UG1 Optimisation Modification (Appendix B).

In the unlikely event this peak increase in take occurs at the same time as the peak licensing requirement for the Moolarben Coal Complex as a whole (including water extracted from the northern and southern borefields), the total predicted take would still remain within MCO's existing licensed allocation (Appendix B).

### **Groundwater Users**

Due to the very limited change in drawdown resulting from the UG1 Optimisation Modification, there would be no impacts on other groundwater users (Appendix B).

### **Aquifer Interference Policy**

An assessment of the UG1 Optimisation Modification against the minimal impact considerations in the *NSW Aquifer Interference Policy* (the AIP) (NSW Government, 2012a) was conducted as part of the Groundwater Assessment (Appendix B). The Groundwater Assessment concluded that the UG1 Optimisation Modification is within the 'Level 1' minimal impact considerations outlined in the AIP as discussed further in Section 5.2.2.

### **4.2.3 Mitigation Measures, Management and Monitoring**

Groundwater monitoring and management for the Moolarben Coal Complex would continue to be conducted in accordance with the Water Management Plan.

The Water Management Plan would be reviewed and, where necessary, updated to incorporate the UG1 Optimisation Modification.

## **4.3 NOISE**

A Noise Assessment for the UG1 Optimisation Modification has been undertaken by SLR Consulting (2015a) (Appendix C).

### **4.3.1 Background**

A number of noise assessments have been undertaken since 2006 to assess the potential impacts of Stages 1 and 2 of the Moolarben Coal Project. The most recent assessment of operational noise impacts for the approved Moolarben Coal Complex (incorporating Stages 1 and 2) was conducted by EMGA Mitchell McLennan (EMM) (2013a).

The assessment predicted that six privately-owned residences would experience noise levels above the Project-specific noise limit (PSNL) of 35 A-weighted decibels (dBA) equivalent continuous noise level (dBA  $L_{Aeq(15\text{minute})}$ ) (EMM, 2013a). MCO has since purchased one of these properties and a further property (Receiver 63) is subject to a private agreement with MCO.

These exceedances of the PSNL were approved, subject to the management, mitigation and monitoring of noise impacts from the Moolarben Coal Complex in accordance with the requirements of Project Approvals (05\_0117 and 08\_0135). This includes:

- the right to request property acquisition for Receiver 32 or where noise exceeds the Project Approval Land Acquisition Criteria at privately-owned residences or over 25% or more of privately-owned land;
- Project Approval noise limits for privately-owned residences;
- the right to request mitigation measures for residences where noise levels are greater than the Project Approval Noise Mitigation Criteria; and

- the right for the NSW Department of Education and Communities to request reasonable and feasible noise (and dust) mitigation measures to be implemented at the Ulan Public School or for MCO to contribute to or meet reasonable costs towards relocating the Ulan Public School.

A noise assessment was prepared by SLR Consulting (2015b) for the OC4 South-West Modification and is currently subject to separate assessment and approval. The noise assessment concluded that there would be no additional exceedances of the relevant criteria for the Moolarben Coal Complex incorporating the OC4 South-West Modification.

### **Noise Management and Monitoring**

The approved Noise Management Plan<sup>5</sup> has been prepared to manage Project-specific and cumulative noise impacts associated with the Moolarben Coal Complex. The Noise Management Plan describes the noise monitoring program, which consists of a combination of operator-attended and continuous real-time noise monitoring, as well as two Automatic Weather Stations (AWS) (Figure 8). An additional mobile AWS has been established near OC2 (Figure 8).

MCO implements a range of noise control and management measures at the Moolarben Coal Complex, including mine planning controls, operational controls, engineering controls, a real-time response protocol, meteorological forecasting and continuous improvement to identify and manage noise impacts aimed to achieve compliance with the approved noise criteria.

Reasonable and feasible on-site noise controls implemented to minimise noise emissions from the Moolarben Coal Complex of relevance to underground operations include:

- implementation of meteorological forecasting to inform daily operations;
- use of real-time noise monitoring data that incorporate automatic noise alarms to assist operational personnel in proactive management of noise impacts; and

- use of operational personnel to monitor real time noise data (from the combined underground and open cut operations) to assist production supervisors in proactive management of noise impacts.

Operator-attended noise monitoring is used to demonstrate compliance with Project Approval noise criteria, whilst continuous real-time monitoring is used as a noise management tool to assist MCO to take pre-emptive noise management actions to avoid potential non-compliances.

MCO has also recently implemented new software that assists in pro-active management of noise (and dust) emissions. The system provides daily reports and predictions of upcoming meteorological conditions and potential noise risks. Based on prevailing wind conditions, MCO can strategically alter its operations to reduce these impacts.

A description of these management measures is provided in Appendix C.

MCO maintains a complaints register in accordance with its Project Approvals (05\_0117 and 08\_0135). All noise related complaints received by MCO are responded to and investigated in accordance with the Community Complaints Procedure detailed in the Noise Management Plan. A review of noise related complaints is provided in Appendix C.

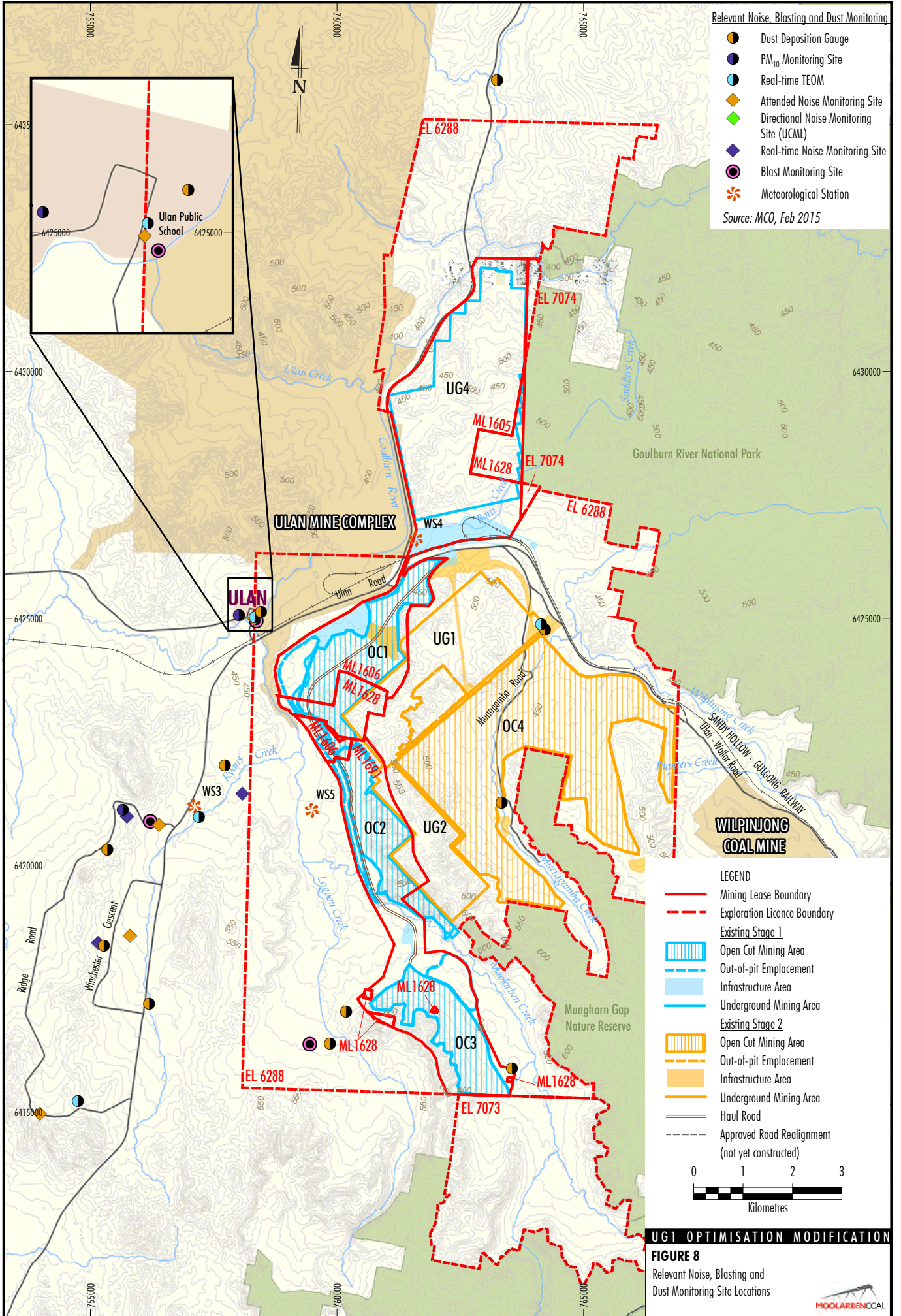
MCO reports noise monitoring results in its Monthly Environmental Monitoring Report and Annual Environmental Management Report (AEMR)/Annual Review. A review of the noise monitoring reports is provided in Appendix C.

### **4.3.2 Environmental Review**

Noise modelling was conducted by SLR Consulting (2015a) to predict potential noise impacts from the Moolarben Coal Complex incorporating the UG1 Optimisation Modification.

SLR Consulting conducted a noise investigation survey in July and August 2014 to validate the Moolarben Coal Complex noise model, reflect as-built features and to review the model calibration (Appendix C).

<sup>5</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Noise Management Plan.



### **Assessable Meteorological Conditions**

The NSW *Industrial Noise Policy* assessable meteorological noise modelling parameters are presented in Appendix C, and are generally consistent with the previously assessed meteorological conditions.

The Stage 1 Modification 9 noise assessment for the approved Moolarben Coal Complex assessed noise impacts during temperature inversions up to 3.9 degrees Celsius (°C) per 100 m.

Direct temperature gradient measurement at the 60 m high temperature tower at the Wilpinjong Coal Mine has provided additional data regarding temperature gradients that occur in the area (Appendix C).

Based on analysis of available data between August 2011 and July 2014, SLR Consulting identified that noise impacts during temperature gradients up to 5.2°C per 100 m were assessable under the NSW *Industrial Noise Policy*.

### **Modelling Scenarios**

The UG1 Optimisation Modification involves the construction and operation of a coal conveyor between the UG1 pit top facilities and CHPP area, sizing station, additional dozers on the underground ROM stockpile and operation of ventilation fans above the Remote Services Facilities and rear air intake shaft.

SLR Consulting (Appendix C) modelled and assessed two key scenarios to assess potential noise impacts associated with the UG1 Optimisation Modification in accordance with the NSW *Industrial Noise Policy*:

- 2016 scenario, representing intrusive mine operating noise levels for the Moolarben Coal Complex (i.e. as determined for the OC4 South-West Modification) and on-site construction noise levels for UG1 (daytime only).
- 2018 scenario, representing operation of the Moolarben Coal Complex incorporating the UG1 Optimisation Modification (including the proposed changes modelled for the OC4 South-West Modification).

### **Reasonable and Feasible Mitigation Measures**

Where relevant, existing mitigation measures (Section 4.3.2) and mitigation measures proposed for the OC4 South-West Modification were incorporated into the noise modelling conducted for the UG1 Optimisation Modification.

In addition, the following reasonable and feasible noise mitigation measures would be implemented for the UG1 Optimisation Modification (Appendix C):

- attenuation of mobile equipment such as the dozers on the underground ROM stockpile; and
- procurement of “low noise” fixed plant (i.e. conveyor drives and conveyor idlers).

### **Potential Impacts**

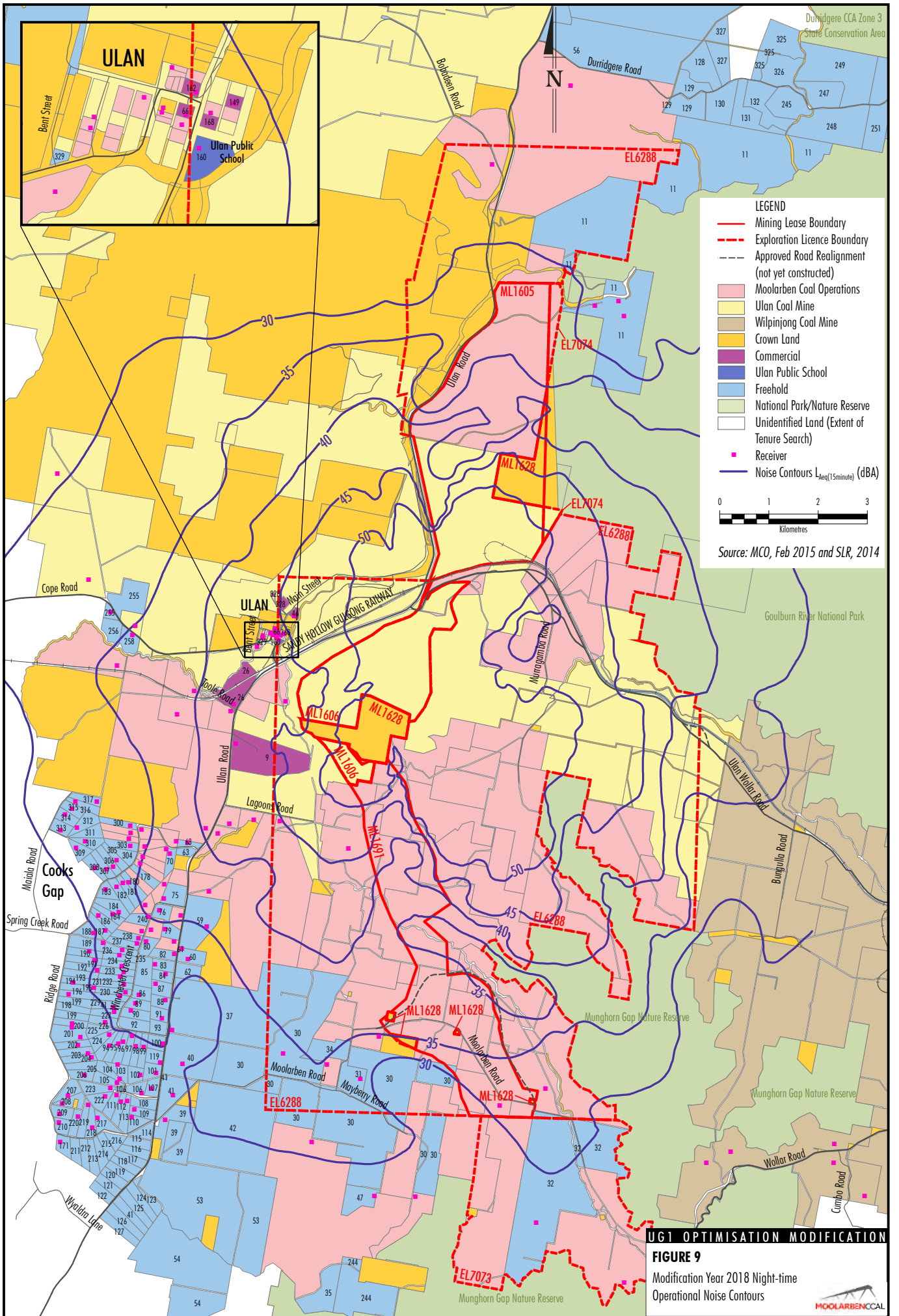
Potential construction noise (i.e. 2016 scenario) was assessed cumulatively with Moolarben Coal Complex operations and compared to Project Approval noise limits, as it is considered the construction noise for UG1 would be indistinguishable from other noise. The noise modelling shows no exceedances of the current Project Approval noise limits are predicted during the construction period of UG1 at any privately-owned receiver.

During the 2018 scenario, one exceedance of the current Project Approval noise limits is predicted at a privately-owned receiver (258 Elias) with the implementation of reasonable and feasible mitigation measures and the continued implementation of the noise management strategy (Appendix C). The predicted noise level at this receiver is 1 decibel (dB) above the Project Approval noise limit and PSNL of 35 dBA.

In accordance with the *Voluntary Land Acquisition and Mitigation Policy* (NSW Government, 2014), the impact of this predicted exceedance (1 dB) is considered to be negligible, would not be discernable by the average listener and would not warrant receiver based treatments or controls.

No other exceedances of the Project Approval noise limits at privately-owned receivers or vacant land are predicted (Appendix C).

Indicative noise contours for night-time operations under adverse meteorological conditions for the Moolarben Coal Complex incorporating the UG1 Optimisation Modification (2018 scenario) are shown on Figure 9.



In accordance with the NSW *Industrial Noise Policy*, SLR Consulting has also considered noise levels against PSNLs determined for the Moolarben Coal Complex. The results of this assessment are presented in Appendix C.

### **Rail Noise**

The UG1 Optimisation Modification would increase the number of average daily product coal departures to seven per day and the peak daily departures to nine per day.

SLR Consulting has undertaken a cumulative rail noise assessment of potential rail noise impacts in accordance with the *Rail Infrastructure Noise Guideline* (RING) (EPA, 2013).

In accordance with the requirements of the RING Appendix 2, where the cumulative rail noise level exceeds the noise assessment trigger levels and project-related noise increases greater 0.5 dBA are predicted, all feasible and reasonable noise mitigation measures should be implemented (Appendix C).

The  $L_{Amax}$  passby noise levels would not change due to the UG1 Optimisation Modification (Appendix C).

The average Project-related rail noise level increase for both day and night is 0.3 dBA (i.e. less than 0.5 dBA) and the peak Project-related rail noise level increase for both day and night is 0.5 dBA (i.e. not greater than 0.5 dBA). SLR Consulting (Appendix C) concluded that an assessment of “all feasible and reasonable noise mitigation measures” in accordance with the RING was therefore not warranted.

SLR Consulting (Appendix C) also concluded that the nearest potentially affected villages of Ulan, Araluen, Wollar, Mogo, and Barigan are located well beyond rail noise affected areas for daytime and night-time rail movements on both an average and peak basis.

### **Road Traffic Noise**

The anticipated increase in the Moolarben Coal Complex workforce (Section 3.9) would result in additional traffic movements in the vicinity of the Moolarben Coal Complex. A Road Transport Assessment has been prepared for the UG1 Optimisation Modification and is described in Section 4.8.

SLR Consulting has undertaken a road traffic noise assessment of potential noise impacts along Ulan Road in accordance with the *NSW Road Noise Policy* (NSW Department of Environment, Climate Change and Water [DECCW], 2011).

The relative increase in traffic noise arising from the incremental increase in Moolarben Coal Complex traffic in comparison to existing and projected 2017 traffic levels is much less than 2 dBA. In accordance with the *NSW Road Noise Policy* this degree of change represents a minor impact that is considered barely perceptible (Appendix C).

No additional dwellings are predicted to exceed the total road traffic noise criteria due to the UG1 Optimisation Modification (Appendix C).

The Ulan Road Strategy identified residences at risk from increased cumulative mine-related traffic road noise and proposed a mechanism to provide noise attenuation treatments which has been accepted by the three mines (MCO, UCML and WCPL).

#### **4.3.3 Mitigation Measures, Management and Monitoring**

MCO will continue to mitigate, monitor and manage potential noise impacts from the Moolarben Coal Complex in accordance with the Noise Management Plan, which would be updated to incorporate the UG1 Optimisation Modification, via a combination of the following:

- reasonable and feasible mitigation measures;
- predictive meteorological forecasting, and associated pre-emptive noise management measures when adverse meteorological conditions are predicted;
- real-time noise monitoring and associated pre-emptive noise management measures when trigger levels (set below Project Approval noise limits) are exceeded; and
- attended noise monitoring to confirm ongoing compliance with Project Approval noise limits.

#### **Ulan Public School**

In accordance with the requirements of the Project Approvals (Attachments 1 and 2), MCO would:

- consult with Department of Education and Communities and, if requested, implement agreed reasonable and feasible measures to ameliorate potential noise and/or dust impacts to Ulan Public School; or

- on a reasonable basis relating to the adverse effect of noise and/or dust from the Moolarben Coal Complex, negotiate with Department of Education and Communities to contribute to or meet reasonable costs toward relocating the Ulan Public School.

#### 4.4 AIR QUALITY

An Air Quality Assessment for the UG1 Optimisation Modification has been undertaken by Todoroski Air Sciences (2015a) (Appendix D).

Aspects relating to dust emissions are discussed in the subsections below. Greenhouse gas emissions are discussed separately in Section 4.11.2.

##### 4.4.1 Background

###### *Previous Assessments*

A number of air quality assessments have been undertaken since 2006 to assess the potential impacts of Stages 1 and 2 of the Moolarben Coal Project. The most recent assessment of the potential air quality impacts associated with the approved Moolarben Coal Complex (incorporating Stages 1 and 2) was undertaken by Todoroski Air Sciences (2013).

The assessments predicted there would be no exceedances of annual average criteria for particulate matter with diameter less than 10 microns (PM<sub>10</sub>), total suspended particulate (TSP) or dust deposition levels due emissions from the project only.

An exceedance of 24-hour average PM<sub>10</sub> criterion was predicted at one private-owned receiver on one day (Receiver 46<sup>6</sup>). An exceedance of the cumulative annual average PM<sub>10</sub> criterion was also predicted at Receiver 46 when emissions from the Moolarben Coal Complex were considered cumulatively with background sources (Todoroski Air Sciences, 2013).

Previous assessment of cumulative 24-hour average PM<sub>10</sub> impacts found there would be a low potential risk for cumulative 24-hour average PM<sub>10</sub> impacts due to the Moolarben Coal Complex (i.e. an exceedance for one day only was predicted when emissions from Moolarben Coal Complex were considered cumulatively with background sources) (Todoroski Air Sciences, 2013).

An air quality assessment was prepared by Todoroski Air Sciences (2015b) for the OC4 South-West Modification and is currently subject to separate assessment and approval. The air quality assessment concluded that there would be no additional exceedances of the relevant criteria for the Moolarben Coal Complex incorporating the OC4 South-West Modification.

###### *Air Quality Management and Monitoring*

The approved Air Quality Management Plan<sup>7</sup> describes the air quality management and monitoring regime at the Moolarben Coal Complex. The Air Quality Management Plan describes:

- Project Approval air quality criteria.
- Dust monitoring locations and frequency, comprising (Figure 8):
  - TEOMs measuring PM<sub>10</sub> continuously (i.e. real-time monitor);
  - High Volume Air Samplers (HVAS) measuring PM<sub>10</sub> on a one day in six cycle; and
  - dust deposition gauges.
- Ongoing dust management measures.
- Real-time response triggers (set below Project Approval air quality criteria) which, if exceeded, trigger the implementation of additional dust management measures.

Operational air quality management measures that will be implemented for underground mining operations at the Moolarben Coal Complex include:

- employing appropriate dust suppression methods at the coal handling facilities;
- maintaining coal handling areas and stockpiles in a moist condition using water carts and/or water sprays;
- relocation, modification and/or temporarily ceasing mining operations (e.g. dozers on the underground coal stockpile) in adverse meteorological conditions to minimise the short term air quality impacts;
- partial enclosure of coal transfer conveyors where reasonable and feasible;

<sup>6</sup> Receiver 46 is a commercial property and is listed as a property that can request acquisition in the Ulan Mine Complex Project Approval (08\_0184).

<sup>7</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Air Quality Management Plan.



- use of water carts on all trafficked areas to minimise dust generation as necessary and practicable; and
- use of constructed roads only, minimisation of access roads and removal of obsolete access roads.

MCO has recently implemented new software that assists in pro-active management of dust (and noise) emissions. The system provides daily reports and predictions of upcoming meteorological conditions and potential dust risks. Based on prevailing wind conditions, MCO can strategically alter its operations to reduce these impacts.

In accordance with the requirements of Project Approvals (05\_0117 and 08\_0135), MCO co-ordinates the air quality management on-site with the air quality management at the Ulan Mine Complex and Wipinjong Coal Mine to minimise cumulative air quality impacts.

MCO reports air quality monitoring results in its Monthly Environmental Monitoring Report and AEMR/Annual Review.

Air quality monitoring results reported in the 2012 - 2013 AEMR and 2013 - 2014 AEMR show cumulative dust levels were below Project Approval criteria, with the exception of isolated exceedances of the 24-hour PM<sub>10</sub> criterion, which were attributable to regional smoke haze events and/or local background sources not associated with the Moolarben Mine Complex.

MCO maintains a complaints register in accordance with its Project Approvals (05\_0117 and 08\_0135). All dust related complaints received by MCO are responded to and investigated in accordance with the Community Complaints Procedure detailed in the Air Quality Management Plan.

There were two complaints reported in the 2013-2014 AEMR relating to dust. There have been a total of five complaints reported over the last three AEMR reporting periods (i.e. 2011 to 2014).

#### 4.4.2 Environmental Review

##### **Modelling Methodology**

Air quality dispersion modelling has been conducted by Todoroski Air Sciences (2015a) to assess potential impacts for the operational scenario representative of maximum potential air quality impacts for the Moolarben Coal Complex incorporating the UG1 Optimisation Modification, particularly for receivers to the west.

Consistent with the approach for the OC4 South-West Modification, a year 2016 scenario was chosen for the air quality modelling scenario. The 2016 scenario incorporates the proposed coal conveyor between the UG1 pit top facilities and CHPP area, dozers on the underground coal stockpile and stockpile extensions.

It is noted that this is a conservative approach as these fixed and mobile fleet would not be fully operational until approximately 2017. Further justification for the scenario selection is provided in the OC4 South-West Modification and Appendix D.

The 2016 scenario is considered to be representative of a scenario equivalent to the Year 6 scenario modelled for Stage 1 Modification 9 and therefore allows for a comparison to be made between the existing/approved Moolarben Coal Complex and the UG1 Optimisation Modification (Appendix D).

##### *Emissions Estimation*

Emissions of TSP (i.e. dust) associated with the Moolarben Coal Complex incorporating the UG1 Optimisation Modification for 2016 were estimated by Todoroski Air Sciences (2015a) using contemporary emission estimation methodologies.

The estimated annual emissions of TSP incorporating the UG1 Optimisation Modification are generally similar or marginally lower when compared to the approved Moolarben Coal Complex (Appendix D).

##### *Meteorological Conditions*

The CALMET meteorological model developed by Todoroski Air Sciences for the Stage 1 Modification 9 assessment was revised to incorporate changes in topography for the Year 2016 mine plan (Appendix D).

##### **Predicted Impacts**

###### *Project Only*

Concentrations of TSP, PM<sub>10</sub> and particulate matter 2.5 microns or less in diameter (PM<sub>2.5</sub>) as well as dust deposition levels were predicted for the Moolarben Coal Complex incorporating the UG1 Optimisation Modification.

The modelling shows that the incorporation of the UG1 Optimisation Modification would reduce total air quality emissions (Appendix D).

With the implementation of proactive and reactive management measures, there were no predicted exceedances of the 24-hour average PM<sub>10</sub> criteria, or annual average TSP, PM<sub>10</sub> or dust deposition criteria, at any privately-owned residence due to emissions from the project only (i.e. the Moolarben Coal Complex incorporating the UG1 Optimisation Modification) (Appendix D).

In addition, 24-hour average and annual average PM<sub>2.5</sub> concentrations were predicted to be below reporting guidelines at all privately-owned residences (Appendix D).

Contours showing predicted project only 24-hour PM<sub>10</sub> concentrations are provided on Figure 10.

#### *Cumulative*

Given annual dust emissions are estimated to be similar or lower than those previously assessed for the Moolarben Coal Complex, and no additional project only exceedances of air quality criteria are predicted, Todoroski Air Sciences (Appendix D) concluded that it is unlikely that there would be any increase in potential cumulative air quality impacts due to the Moolarben Coal Complex incorporating the UG1 Optimisation Modification.

#### **4.4.3 Mitigation Measures, Management and Monitoring**

MCO would continue to implement the existing air quality management measures described in the Air Quality Management Plan and required by the PRPs to minimise dust emissions and comply with relevant dust criteria in Project Approvals (05\_0117 and 08\_0135). The Air Quality Management Plan would be updated, where necessary, to incorporate the UG1 Optimisation Modification.

#### ***Ulan Public School***

In accordance with the requirements of the Project Approvals (Attachments 1 and 2), MCO would:

- consult with Department of Education and Communities and, if requested, implement agreed reasonable and feasible measures to ameliorate potential dust and/or noise impacts to Ulan Public School; or
- on a reasonable basis relating to the adverse effect of dust and/or noise from the Moolarben Coal Complex, negotiate with Department of Education and Communities to contribute to or meet reasonable costs toward relocating the Ulan Public School.

## **4.5 ECOLOGY**

A Flora and Fauna Impact Assessment has been prepared for the UG1 Optimisation Modification by EcoLogical Australia (2015a) and is presented in Appendix E.

### **4.5.1 Background**

Detailed ecological impact assessments were prepared by Moolarben Biota (2006) and Ecovision (2008) for Stages 1 and 2 of the Moolarben Coal Project respectively. An ecological impact assessment was also undertaken in 2012 for the Moolarben Coal Project Stage 1 Modification 9 EA (EMM, 2013b).

In addition to the above, specific flora and fauna field surveys were conducted in the UG1 Optimisation Modification additional areas (i.e. associated with surface disturbance and/or the underground mining area extensions) in July 2014 by EcoLogical Australia (Appendix E).

A flora and fauna impact assessment was prepared by EcoLogical Australia (2015b) for the OC4 South-West Modification and is currently subject to separate assessment and approval.

The 2014 surveys consisted of validating BioMetric vegetation types, identifying floristic structure, targeting threatened flora and fauna species and undertaking habitat assessment. Whilst some threatened species were out of season for survey (e.g. *Diuris tricolor*), potential habitat for these species was targeted during the field survey (Appendix E).

#### ***Vegetation Communities***

Vegetation communities were mapped within the UG1 Optimisation Modification additional areas based on BioMetric vegetation types.<sup>8</sup> Vegetation communities mapped by EcoLogical are listed in Table 4 and described in Appendix E.

#### ***Threatened Flora Species and Populations***

One threatened flora species listed under the NSW *Threatened Species Conservation Act, 1995* (TSC Act) was recorded above the underground mining area extensions during the 2014 surveys, namely Scant Pomaderris (*Pomaderris queenslandica*) (Appendix E).

<sup>8</sup> The vegetation mapping is considered to be conservative as parts of the area have a recent history of clearing and cultivation and some areas may be classified as regrowth.



**Table 4**  
**Native Vegetation Communities Recorded**

BioMetric Vegetation Types	UG1 Optimisation Modification Additional Areas	
	Surface Disturbance Areas (ha)	Underground Mining Area Extensions (ha)
Rough-barked Apple - Silvertop Stringybark - Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast (HU603)	Nil	15.6
Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands (HU515)	Nil	16.1
White Box - Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin (HU653)	Nil	2.2
White Box - Yellow Box grassy woodland on basalt slopes in the upper Hunter Valley, Brigalow Belt South (HU654)	0.25	2.4
Grey Box - Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin (HU551)	8.1	14.3
Grey Gum - Narrow-leaved Stringybark - Ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin (HU552)	Nil	60.6
Narrow-leaved Stringybark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin (HU574)	Nil	4.4
<b>Total</b>	<b>8.4</b>	<b>115.7</b>

Note: Totals may have minor discrepancies due to rounding.

Source: Appendix E.

No threatened flora species were recorded within the surface disturbance areas associated with the UG1 Optimisation Modification.

No threatened flora populations are present within the UG1 Optimisation Modification additional areas (Appendix E).

#### **Threatened Ecological Communities**

Two threatened ecological communities were recorded during the 2014 survey of the UG1 Optimisation Modification additional areas (Appendix E), namely:

- *White Box – Yellow Box – Blakely's Red Gum Woodland and Derived Native Grassland*, listed as an EEC under the TSC Act and Critically Endangered Ecological Community (CEEC) under the EPBC Act (BioMetric vegetation types HU515 and HU654).
- *Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions* listed as an EEC under the TSC Act (BioMetric vegetation type HU551).

#### **Fauna Habitat**

Fauna habitat in the vicinity of UG1 Optimisation Modification additional areas consists of a suite of broad habitat elements including:

- derived native grasslands;
- shrubbery;

- mature woodland and paddock trees (flower, lerp and mistletoe bearing);
- hollow-bearing live trees and dead trees (stags);
- large woody debris (log and bark on the ground);
- sandstone outcrops and overhangs; and
- water (dams and ponds).

A detailed description of each habitat element is provided in Appendix E.

#### **Threatened Fauna Species and Populations**

Six threatened fauna species (all listed as vulnerable under the TSC Act) were recorded during the 2014 surveys, namely:

- Glossy Black-Cockatoo (*Calyptorhynchus lathamii*);
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*);
- Speckled Warbler (*Chthonicola sagittata*);
- Varied Sittella (*Daphoenositta chrysoptera*);
- Diamond Firetail (*Stagnopleura guttata*); and
- Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*).

No threatened fauna species listed under the TSC Act and/or the EPBC Act were recorded within the additional surface disturbance areas (Appendix E). EcoLogical Australia (Appendix E) concluded the additional surface disturbance areas are unlikely to be important habitat for threatened fauna species due to the pre-mining disturbance of these areas.

No threatened fauna populations are present within the UG1 Optimisation Modification additional areas (Appendix E).

#### 4.5.2 Environmental Review

##### **Potential Impacts**

###### *Additional Surface Disturbance Areas*

The UG1 Optimisation Modification would result in disturbance of approximately 8.4 ha of derived native grassland (Table 4) as a result of the Remote Services Facilities and rear air intake shaft and associated fan. No woodland vegetation communities would be cleared as a result of the UG1 Optimisation Modification.

Construction of the rear intake shaft and associated fan would result in disturbance of up to 0.25 ha of derived native grassland classified as *White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grasslands* EEC/CEEC (Appendix E). This area of derived native grassland has undergone historical clearing and grazing and is located within a larger cleared area (Appendix E). Ecological Australia (Appendix E) concluded that better quality remnants of this community will remain in the locality and the UG1 Optimisation Modification would not place the local occurrence at risk of extinction.

###### *Subsidence*

Ecological Australia (Appendix E) concluded that the potential subsidence of vegetation is not expected to result in a loss of vegetation cover or community structure or direct impacts to fauna habitat. This conclusion is supported by previous local studies that have been unable to detect an impact of subsidence on local vegetation communities (Appendix E).

Direct mortality of a small number of individual plants and animals may occur as a result of subsidence-induced rock fall or collapse, however the impacts of such events are expected to be short-term, localised and not significant (Appendix E).

###### *Threatened Species, Populations and Communities*

EcoLogical Australia (Appendix E) concluded there would be no significant impact on threatened species, populations and communities and migratory species listed under the EPBC Act or TSC Act as a result of the UG1 Optimisation Modification.

###### *Pest Species*

MCO would continue to implement mitigation measures including feral animal management and control in accordance with the Biodiversity Management Plan.

###### *Cumulative Impacts*

The UG1 Optimisation Modification in combination with the current OC4 South-West Modification would result in a reduction of approximately 6.7 ha in the cumulative approved surface disturbance area at the Moolarben Coal Complex (i.e. incorporating the relocation of the approved Stage 2 haul road). Therefore, no additional cumulative impacts are expected.

The Biodiversity Offset Strategy developed for Stage 2 would improve connectivity of local conservation areas and quality of remnant vegetation within the locality and region. This will potentially increase movement corridors for genetic exchange, foraging habitat and increased breeding resources for threatened fauna species (Appendix E).

#### 4.5.3 Mitigation Measures, Management, Monitoring and Offset

The nature and scale of the vegetation to be cleared as part of the UG1 Optimisation Modification is considered minor when compared with the native vegetation within the currently approved Stage 2 disturbance footprint, and the significant Biodiversity Offset Strategy developed for Stage 2.

In addition, the UG1 Optimisation Modification in conjunction with the OC4 South-West Modification would result in a reduction in the total area to be disturbed by the approved Moolarben Coal Complex.

Therefore, the Biodiversity Offset Strategy developed for Stage 2 adequately compensates for the potential impacts associated with the UG1 Optimisation Modification, with surplus area (Appendix E).

Notwithstanding, MCO would continue to implement management and mitigation measures at the Moolarben Coal Complex in accordance with the Biodiversity Management Plan, including:

- implementation of a vegetation clearance protocol including delineation of areas to be cleared, pre-clearing surveys, management of impacts to fauna, vegetation clearance procedures, collection and reuse of habitat features (where feasible);
- preparation of Ground Disturbance Permits to be approved by the Environment and Community Manager prior to the commencement of clearing activities;
- management measures for weeds and pests; and
- topsoil removed during construction works would be stockpiled and used in rehabilitation areas.

The Biodiversity Management Plan would be updated, where necessary, to incorporate the UG1 Optimisation Modification.

#### 4.6 SURFACE WATER RESOURCES

A Surface Water Assessment Review for the UG1 Optimisation Modification has been undertaken by WRM Water & Environment (2015). The Surface Water Assessment Review is presented in Appendix F.

##### 4.6.1 Background

###### *Regional Hydrology*

The Moolarben Coal Complex is located in the Upper Goulburn River and Wollar Creek sub-catchments, which have catchment areas of approximately 2,455 square kilometres (km<sup>2</sup>) and 532 km<sup>2</sup>, respectively. Both sub-catchments drain to the Goulburn River which flows in an easterly direction, eventually joining the Hunter River approximately 150 km downstream of the Moolarben Coal Complex.

Moolarben Creek and Bora Creek are tributaries of the Upper Goulburn River sub-catchment and flow to the west and north of the UG1 (Figure 11).

Wilpinjong Creek is a tributary of Wollar Creek sub-catchment and flows along the east and north-eastern boundaries of the Moolarben Coal Complex into Wollar Creek, before joining the Goulburn River approximately 26 km downstream of the Moolarben Coal Complex (Figure 1).

##### **Site Water Management and Monitoring**

Surface water monitoring and management at the Moolarben Coal Complex is conducted in accordance with the Water Management Plan, including Erosion and Sediment Control Plan, Surface Water Monitoring Program and Surface and Ground Water Response Plan<sup>9</sup>.

A review of the available surface water monitoring data conducted by WRM Water & Environment in 2013 concluded that the existing operations were not adversely affecting the quality of receiving waters (WRM Water & Environment, 2013).

The Moolarben Coal Complex surface water monitoring sites are shown on Figure 11.

#### 4.6.2 Environmental Review

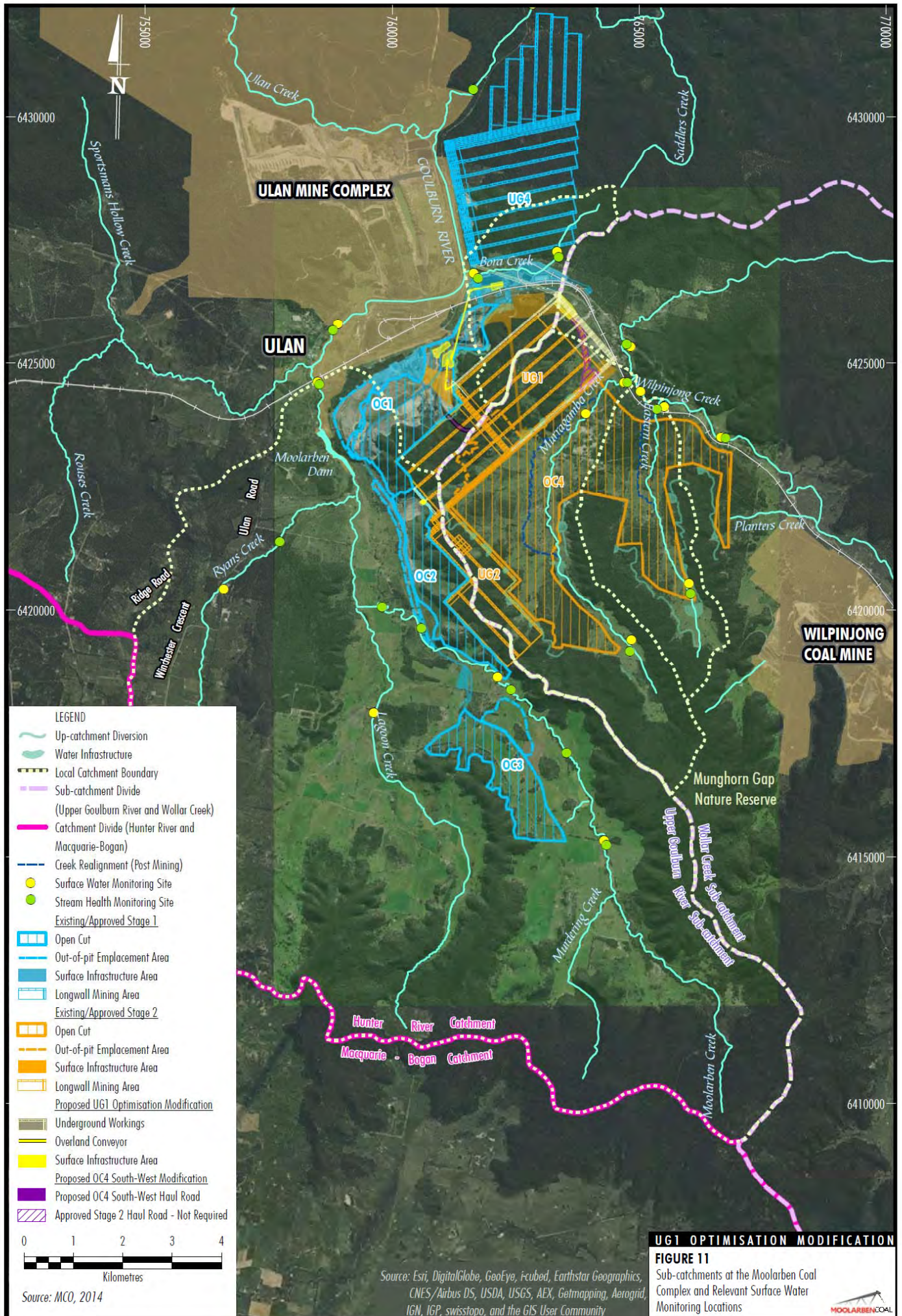
##### **Site Water Management**

The existing Moolarben Coal Complex water management system, including changes proposed for the UG1 Optimisation Modification, are described in Sections 2.10 and 3.6, respectively.

WRM Water & Environment (2015) reviewed the site water balance for the UG1 Optimisation Modification. It was concluded that the changes to site water balance would be small in comparison to the approved Moolarben Coal Complex and would be adequately managed under the existing surface water management system, given (Appendix F):

- the minor increase to the area captured within the water management system (additional 5.2 ha) would have a negligible impact on the site water balance and the performance of the existing and proposed water management infrastructure;
- the minor increase in stockpile dust suppression demand would result in a very minor increase in the overall annual site demand; and
- additional underground demands associated with the increased underground mining rate (up to 80 ML/year) would be almost fully compensated by the predicted increase in groundwater inflows (up to 69 ML/year).

<sup>9</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as a delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Water Management Plan.



MCO would continue to undertake regular reviews of the site water balance, which is inherently highly influenced by site rainfall. If stored water volume falls, MCO can implement sourcing of water through sharing arrangements with adjoining mines and/or from licensed water supply bores. If stored water volumes are excessive, MCO can release water off-site in accordance with the requirements of EPL 12932, subject to stringent release criteria and conditions being met.

### **Stream Flows and Water Quality**

The Remote Services Facilities would remove approximately 5.2 ha of catchment that would otherwise report to Wilpinjong Creek (Appendix F). The loss of catchment represents approximately 0.3% of the total catchment of Wilpinjong Creek and therefore the change in catchment area due to the Remote Services Facilities would have a negligible impact on the stream flows and water quality in the receiving environment (Appendix F).

The small disturbance footprint associated with the rear air intake shaft (approximately 0.02 ha during operations) would be managed using existing erosion and sediment control procedures and therefore would have negligible impact on stream flows and water quality in the receiving environment (Appendix F).

### **Potential Subsidence Impacts**

A number of minor unnamed drainage lines overlie the UG1 mine layout in relatively steep topography. These drainage lines have been designated DL4, DL5, DL6 and DL7 on Figure 7.

Two of these drainage lines (DL4 and DL5) are located within the extent of the approved OC4 out-of-pit emplacement (Figure 7) and would be covered with waste rock prior to subsidence occurring as a result of UG1.

The maximum predicted subsidence on drainage lines DL6 and DL7 (Figure 7) would increase from 1,850 mm to 2,225 mm and the maximum tilt would reduce from 70 mm/m to 60 mm/m. There would not be any significant change to approved environmental consequences or proposed management measures for these drainage lines due to the UG1 Optimisation Modification (Appendix A).

Subsidence has the potential to result in topographical depressions that have the potential to result in areas of ponding, dependent on a number of factors such as rainfall, catchment sizes, surface water runoff, permeation and evaporation.

Topographical depressions for the approved UG1 mine layout are predicted to range from 0.2 m to 3.2 m in depth, with maximum areas of approximately 0.3 ha (Appendix F). The UG1 Optimisation Modification would result in a minor increase in depth of these topographical depressions (approximately 20 cm), and approximately five additional topographic depressions with very shallow depths and small surface areas (maximum of 40 cm depth and maximum surface area of 0.4 ha) (Appendix F).

Potential management measures for areas where ponding is observed following subsidence may include the implementation of minor engineering works (Appendix F). As the potential impact of the UG1 Optimisation Modification on the depth, size and number of topographical depressions is small, the mitigation strategies remains unchanged for the UG1 Optimisation Modification (Appendix F).

### **4.6.3 Mitigation Measures, Management and Monitoring**

Surface water monitoring and management for the Moolarben Coal Complex would continue to be conducted in accordance with the Water Management Plan.

The Water Management Plan would be reviewed and, where necessary, updated to incorporate the UG1 Optimisation Modification.

Subsidence impacts including the potential for ponding would be monitored and managed through the Extraction Plan process.

## **4.7 ABORIGINAL HERITAGE**

An Aboriginal Cultural Heritage Assessment (ACHA) has been prepared for the UG1 Optimisation Modification by Niche Environment and Heritage (2015) and is presented in Appendix G.

### **4.7.1 Background**

The ACHA for the UG1 Optimisation Modification has been undertaken in consideration of the following codes and guidelines (Appendix G):

- *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a).
- *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW, 2010b).



- *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* (OEH, 2011).

### **Previous Archaeological Investigations**

A number of Aboriginal cultural heritage surveys, assessments and salvage programmes have been undertaken within the Moolarben Coal Complex area and surrounds.

Key Aboriginal cultural heritage surveys and assessments were undertaken for Stages 1 and 2 of the Moolarben Coal Project in 2006, 2008, 2011 and 2012 (Archaeological Risk Assessment Services, 2006, 2008; AECOM, 2011; South East Archaeology, 2013). Various other minor surveys and assessment have also been undertaken.

A detailed description of previous archaeological assessments and surveys undertaken at the Moolarben Coal Complex and surrounds is provided in Appendix G.

At the time of drafting the ACHA (Appendix G), a total of 603 Aboriginal sites had been identified at the Moolarben Coal Complex and surrounds, including artefact scatters, isolated finds, potential archaeological deposits, grinding grooves, ochre quarries, scarred trees and rock shelters (with or without artefacts, art and/or grinding grooves).

The management of Aboriginal heritage at the Moolarben Coal Complex is currently conducted in accordance with the measures outlined in the Aboriginal Heritage Management Plan (Stage 1)<sup>10</sup>.

## **4.7.2 Environmental Review**

### **Consultation**

The ACHA included consultation with eight Registered Aboriginal Parties, identified via a registration process consistent with the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010a) (Appendix G).

Consultation with Registered Aboriginal Parties regarding the existing Moolarben Coal Complex has been extensive and involved various methods of communication including public notices, meetings, written and verbal correspondence, archaeological survey attendance and site inspections.

A detailed description of the consultation undertaken for the UG1 Optimisation Modification is provided in Appendix G.

### **Desktop Review**

An AHIMS search was undertaken in February and September 2014 (Appendix G) for the UG1 Optimisation Modification area and surrounds. Based on the AHIMS search and the Moolarben Coal Complex Aboriginal sites database, eight previously recorded Aboriginal sites are located within the UG1 Optimisation Modification additional areas. All of these sites consisted of stone artefact scatters or isolated stone artefacts.

### **Archaeological Survey Design**

Archaeological surveys of the UG1 Optimisation Modification additional areas were undertaken in consultation with the Registered Aboriginal Parties in July 2014.

### **Archaeological Findings**

Three new Aboriginal objects were identified during July 2014 surveys comprising two isolated finds and one stone artefact scatter. Detailed descriptions of these sites are presented in Appendix G.

### **Archaeological and Cultural Heritage Values**

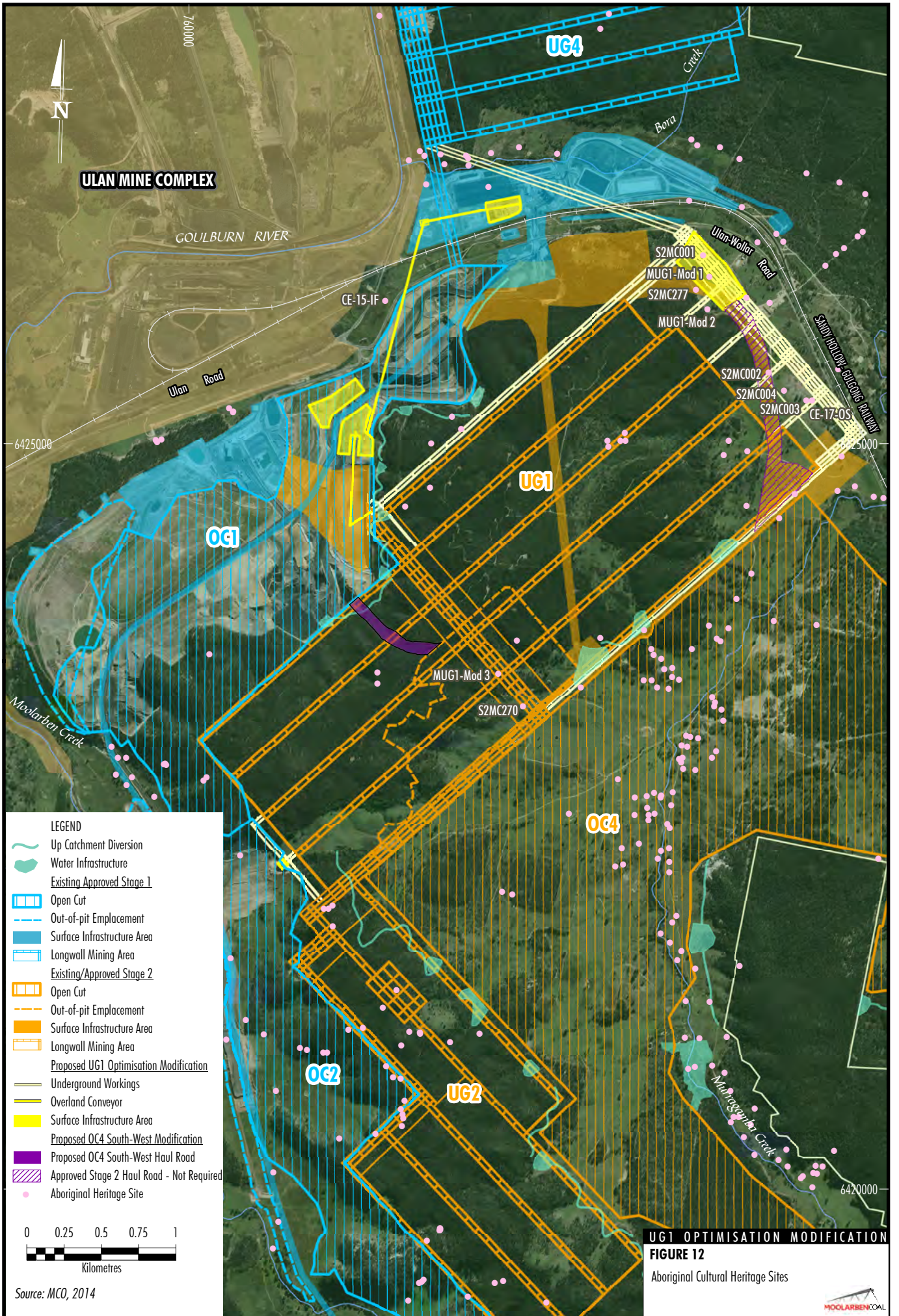
All of the Aboriginal heritage objects identified in the UG1 Optimisation Modification additional areas were assessed as having low scientific significance (Appendix G). These sites are shown on Figure 12. No Aboriginal heritage sites of moderate or high archaeological significance were recorded (Appendix G).

There were no specific areas or places of cultural value identified by the Registered Aboriginal Parties during the archaeological survey undertaken for the UG1 Optimisation Modification. Previous assessments and surveys have identified and documented cultural values for the Moolarben Coal Complex and surrounds, which are documented in Appendix G.

### **Surface Disturbance**

Surface works associated with the UG1 Optimisation Modification would include the development of the Remote Services Facilities, the ROM coal conveyor and associated transfer points and the rear air intake shaft and associated fan.

<sup>10</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as a delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Heritage Management Plan.



**ULAN MINE COMPLEX**

- LEGEND**
- Up Catchment Diversion
  - Water Infrastructure
  - Existing Approved Stage 1
  - Open Cut
  - Out-of-pit Emplacement
  - Surface Infrastructure Area
  - Longwall Mining Area
  - Existing/Approved Stage 2
  - Open Cut
  - Out-of-pit Emplacement
  - Surface Infrastructure Area
  - Longwall Mining Area
  - Proposed UG1 Optimisation Modification
  - Underground Workings
  - Overland Conveyor
  - Surface Infrastructure Area
  - Proposed OC4 South-West Modification
  - Proposed OC4 South-West Haul Road
  - Approved Stage 2 Haul Road - Not Required
  - Aboriginal Heritage Site



Source: MCO, 2014

**UG1 OPTIMISATION MODIFICATION**  
**FIGURE 12**

Aboriginal Cultural Heritage Sites



The UG1 Optimisation Modification has the potential to directly impact three additional Aboriginal heritage sites as a result of surface disturbance works (Figure 12). Sites S2MC001 and MUG1-Mod 1 are located within the proposed Remote Services Facilities area. Site CE-15-IF is located within the surveyed area for the coal conveyor corridor however the final alignment of the conveyor avoids this site (Figure 12).

Both sites with the potential to be directly impacted by the UG1 Optimisation Modification (S2MC001 and MUG-1 Mod 1) are isolated stone artefacts of low archaeological significance.

### **Subsidence Impacts**

Potential subsidence impacts from underground mining operations associated with the UG1 Optimisation Modification are summarised in Section 4.1 and are discussed in detail in Appendix A. The potential impacts of subsidence effects on Aboriginal heritage are summarised below and described further in Appendices A and G.

It is unlikely that the scattered artefacts or isolated finds would be impacted by mine subsidence. However it is possible that if remediation works to the surface areas around the sites was required after mining, these remediation works could potentially impact on archaeological sites.

Remediation works that have the potential to directly impact a known site would be undertaken in accordance with a Heritage Management Plan and following consultation with a qualified archaeologist should any works be required.

Based on the above, no Aboriginal heritage sites are anticipated to be significantly impacted as a result of additional subsidence associated with the UG1 Optimisation Modification.

### **4.7.3 Management and Mitigation Measures**

MCO would implement the management and mitigation measures described in Appendix G and the Heritage Management Plan, including monitoring and management measures to be implemented during the construction of the UG1 Optimisation Modification.

The Heritage Management Plan would be reviewed and updated to incorporate the UG1 Optimisation Modification. The Heritage Management Plan would be updated to include salvage of sites that would be directly impacted as a result of surface disturbance works for the UG1 Optimisation Modification.

## **4.8 ROAD TRANSPORT**

A Road Transport Assessment has been prepared for the UG1 Optimisation Modification by GTA Consultants (2015) and is presented in Appendix H.

### **4.8.1 Background**

The following key roads are of relevance to the Moolarben Coal Complex (Figure 13):

- Main Road 208 (MR208) – extends between Mudgee and Sandy Hollow through Budgee Budgee, Wollar and Bylong and passes to the south of the Wilpinjong Coal Mine. MR208 is known as Ulan Road, Wollar Road and Wollar-Bylong Road.
- Main Road 214 (MR214) – extends north from Budgee Budgee to Cassilis. MR214 is known as Ulan Road and Ulan-Cassilis Road.
- Main Road 598 (MR598) – provides an east-west link between Gulgong and Ulan. MR598 is known as Cope Road.
- Ulan-Wollar Road – a local rural road which provides an east-west connection between the villages of Ulan and Wollar.

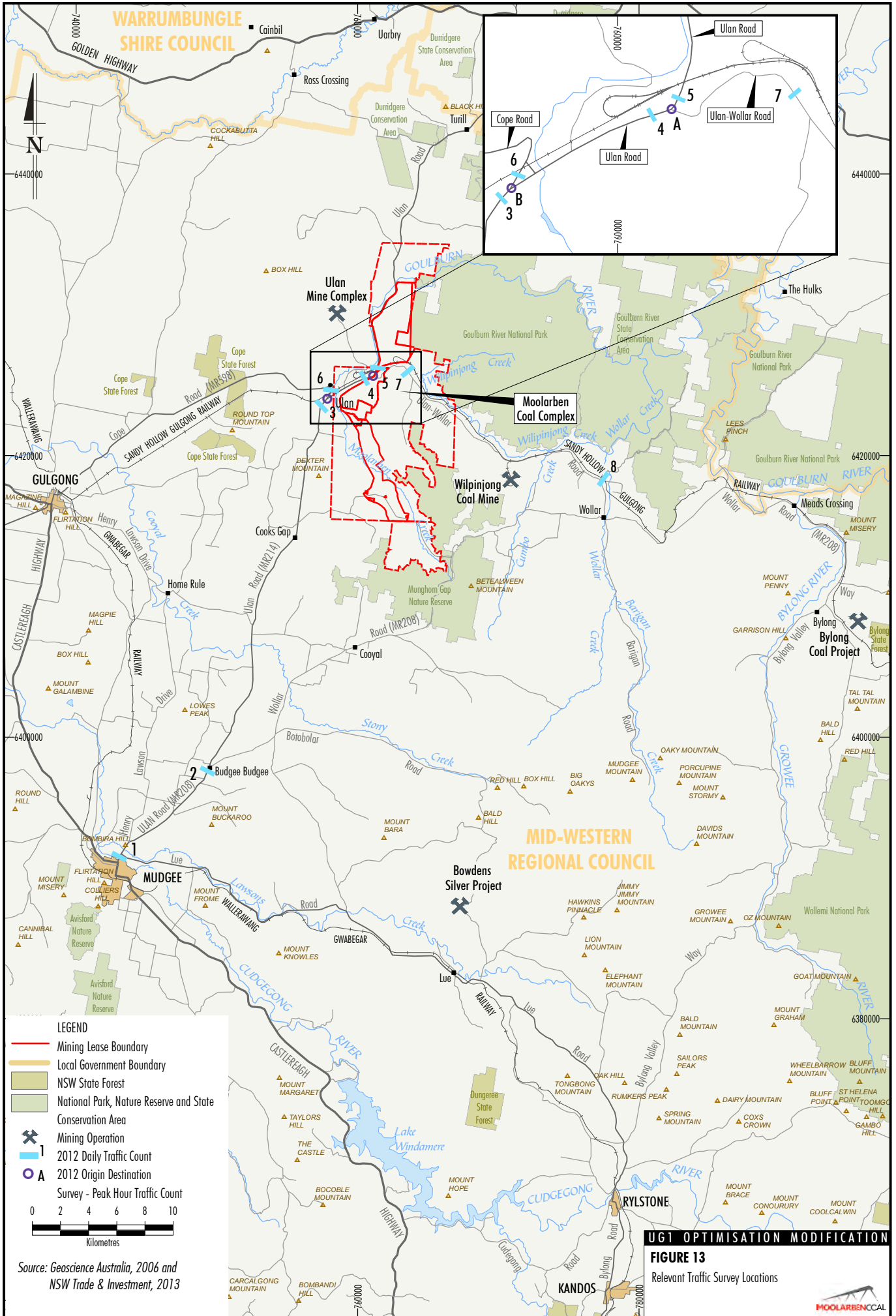
The primary route from Mudgee to the site is via Ulan Road (MR208 and MR214) and Ulan-Wollar Road (Figure 13).

Vehicular access to the Moolarben Coal Complex is provided via the CHPP Access Road off Ulan Road, approximately 1 km north of its intersection with Ulan-Wollar Road, and via the Open Cut Access Road off Ulan-Wollar Road approximately 120 m east of Ulan Road.

An access to the ROM coal facilities from Ulan-Wollar Road approximately 2.4 km east of Ulan Road has also been approved but is yet to be constructed. A vehicular access to OC4 from Ulan-Wollar Road approximately 4.6 km east of Ulan Road has not yet been commissioned.

In accordance with Project Approval (05\_0117) and Project Approval (08\_0135), MCO works with the proponents of the Ulan Mine Complex and Wilpinjong Coal Mine to implement the Ulan Road Strategy.

In addition, MCO also makes financial contributions to MWRC for the maintenance of Cope Road in accordance with Project Approval (08\_0135).



#### 4.8.2 Environmental Review

The Road Transport Assessment includes consideration of the anticipated increase in the Moolarben Coal Complex workforce and other anticipated future traffic changes.

The assessment considered traffic data available from December 2012 (Figure 13) supplemented by traffic surveys of the CHPP Access Road and Open Cut Access Road in March 2015.

##### **Changes in Traffic Volumes**

The anticipated increase in the Moolarben Coal Complex workforce would result in additional employee movements on roads in the vicinity of the Moolarben Coal Complex.

The Road Transport Assessment (Appendix H) considered the projected cumulative traffic volumes on key roads in 2017 (peak workforce) and 2027 as a result of all Moolarben Coal Complex employee, visitor and delivery movements, in combination with other anticipated changes to the road environment (such as background traffic growth and other traffic-generating developments).

##### **Shift Times**

The indicative shift times and workforce numbers for the Moolarben Coal Complex considered by the Road Transport Assessment are presented in Table 5. These shift times would be subject to minor variations to start and finishing times to meet operational requirements.

In accordance with Project Approval (05\_0117) and Project Approval (08\_0135), MCO is required to consider the shift changes of the adjoining Ulan Mine Complex and Wilpinjong Coal Mine and school bus hours in the determination of shift change times at the Moolarben Coal Complex. These requirements create significant constraints in relation to shift times at the Moolarben Coal Complex.

The school buses on Ulan Road operate between 7.30 am and 8.35 am southbound, and between 3.35 pm and 4.35 pm northbound.

The movement of the construction workforce would not coincide with the school bus operating times. The majority of operational employee movements to and from the Moolarben Coal Complex (approximately 90%) would occur outside the school bus operating times on Ulan Road, however there would be some interaction between school buses and underground shift workers departing site.

The proposed Moolarben Coal Complex shift times would minimise any interaction between traffic generated by the Moolarben Coal Complex and the school buses operating on Ulan Road, while also seeking to spread the generated traffic through the day and minimise interaction with traffic generated by the other mines in the area.

##### **Potential Impacts on the Road Network**

The Road Transport Assessment (Appendix H) determined the road network would satisfactorily accommodate the combined influences of the anticipated increase in the Moolarben Coal Complex workforce and other anticipated changes to the road environment (such as background traffic growth and other traffic-generating developments).

The key intersections on the roads serving the Moolarben Coal Complex would continue to operate at satisfactory levels of service, with sufficient capacity to accommodate the additional traffic with spare capacity and short delays for most vehicles (Appendix H).

**Table 5  
Indicative Shift Times and Workforce at the Moolarben Coal Complex**

Shift	Indicative Shift Time	Anticipated Shift Workforce in 2017	Anticipated Shift Workforce in 2027
Administration	7.00 am to 5.00 pm	66	60
Open Cut Day	6.30 am to 7.00 pm	165	150
Open Cut Night	6.30 pm to 7.00 am	165	150
Underground Day	7.00 am to 3.30 pm	53	48
Underground Afternoon	3.00 pm to 11.30 pm	53	48
Underground Night	11.00 pm to 7.30 am	53	47

GTA Consultants (Appendix H) concluded that no significant impacts on the performance, capacity, efficiency and safety of the road network are expected to arise as a result of the UG1 Optimisation Modification.

#### **Potential Impacts on Level Crossings**

GTA Consultants (Appendix H) conducted an assessment of potential impacts on level crossings in the vicinity of the Moolarben Coal Complex.

The assessment considered the impact of up to three trains passing each crossing during peak hour, noting that during the majority of on-street peak hours no more than two train movements occur (Appendix H).

The anticipated increase in the Moolarben Coal Complex workforce would result in increases in the number of vehicles at the Cope Road level crossing only. GTA Consultants (Appendix H) concluded the impact of additional road traffic at the Cope Road level crossing would be low and would not exacerbate the peak queue of vehicles from the level crossing towards Ulan Road.

#### **4.8.3 Management and Mitigation Measures**

As described above, the Road Transport Assessment concluded that satisfactory operating conditions can be expected on the road network without need for specific upgrades (Appendix H).

Notwithstanding the above, MCO will continue to make road maintenance contributions in accordance with Project Approval (05\_0117) and Project Approval (08\_0135).

MCO would also continue regular toolbox talks at which drivers are reminded about acceptable behaviour on the road, particularly in proximity to school buses.

### **4.9 COMMUNITY INFRASTRUCTURE**

A Community Infrastructure Assessment has been prepared for the UG1 Optimisation Modification by Coffey Environments Australia Pty Ltd (Coffey) (2015) and is presented in Appendix I.

#### **4.9.1 Background**

A number of socio-economic assessments have been undertaken since 2006 to assess the potential impacts of Stages 1 and 2 of the Moolarben Coal Project. The Hunter Valley Research Foundation (2008) undertook a cumulative assessment of the potential regional economic impacts of the combined operation of Stages 1 and 2 of the Moolarben Coal Project.

The Moolarben Coal Complex contributes positively to the social and economic environment of the Mid-Western Regional LGA by stimulating regional output and creating employment opportunities (Hunter Valley Research Foundation, 2008).

MCO makes financial contributions to the MWRC in accordance with Moolarben Coal Complex Planning Agreements, Project Approval (05\_0117) and Project Approval (08\_0135).

MCO also makes financial contributions through donations and sponsorship to a number of local organisations in the region as described in Section 2.16.

#### **4.9.2 Environmental Review**

The UG1 Optimisation Modification seeks an increase in the approved Moolarben Coal Complex workforce to incorporate anticipated personnel for the underground and open cut operations (Section 3.9).

#### **Short-term Accommodation Demand**

Coffey (Appendix I) estimates approximately 91 additional commuting construction personnel may require short-term accommodation in the Mid-Western Regional LGA during the peak workforce in 2017 (construction and operation).

Although there are sufficient accommodation facilities available, the short-term accommodation requirements during this period may have a temporary impact on the availability of accommodation for tourists (Appendix I). There is some opportunity for accommodation providers to use this increased demand to invest in additional capacity or upgraded services (Appendix I).

## **Population Change**

Coffey (Appendix I) estimates the anticipated increase in the Moolarben Coal Complex workforce may result in up to 530 new residents associated with direct and indirect employment (and their families) within the Mid-Western Regional LGA. The majority of these new residents (approximately 85%) are expected to reside in Mudgee, with others residing in Gulgong, Rylstone and Kandos (Appendix I).

The predicted increase in population is small compared to the population of the Mid-Western Regional LGA (Appendix I). Coffey (Appendix I) considers the existing community infrastructure in the Mid-Western Regional LGA is capable of servicing the increased population associated with the anticipated increase in the Moolarben Coal Complex workforce.

### **Consideration of Cumulative Impacts**

There are a number of proposed mining projects that would have potential impacts in the Mid-Western Regional LGA, including the Wilpinjong Extension Project, Bylong Coal Project, Bowdens Silver Project and Cobbora Coal Project.

The estimated cumulative population increase of the Mid-Western Regional LGA would be up to approximately 1,600 people (7% of the 2011 population), however the peak would be highly dependent on the timing for each project (Appendix I). Coffey (Appendix I) notes these impacts would occur gradually over several years, which would allow time for housing levels and health and education facilities to adjust to the increasing service demands.

### **4.9.3 Management and Mitigation Measures**

MCO would make additional community enhancement contributions to MWRC in accordance with Project Approval (08\_0135) for the increase in the Moolarben Coal Complex workforce.

MCO would also continue to make contributions in accordance with Moolarben Coal Complex Planning Agreements and Project Approval (05\_0117), and continue its support of local organisations in the region.

Coffey (Appendix I) concludes that the ongoing implementation of existing measures and contributions would mitigate any potential impacts on community infrastructure as a result of the anticipated increase in the Moolarben Coal Complex workforce.

## **4.10 VISUAL**

### **4.10.1 Background**

A number of visual impact assessments have been prepared for the approved Moolarben Coal Complex including:

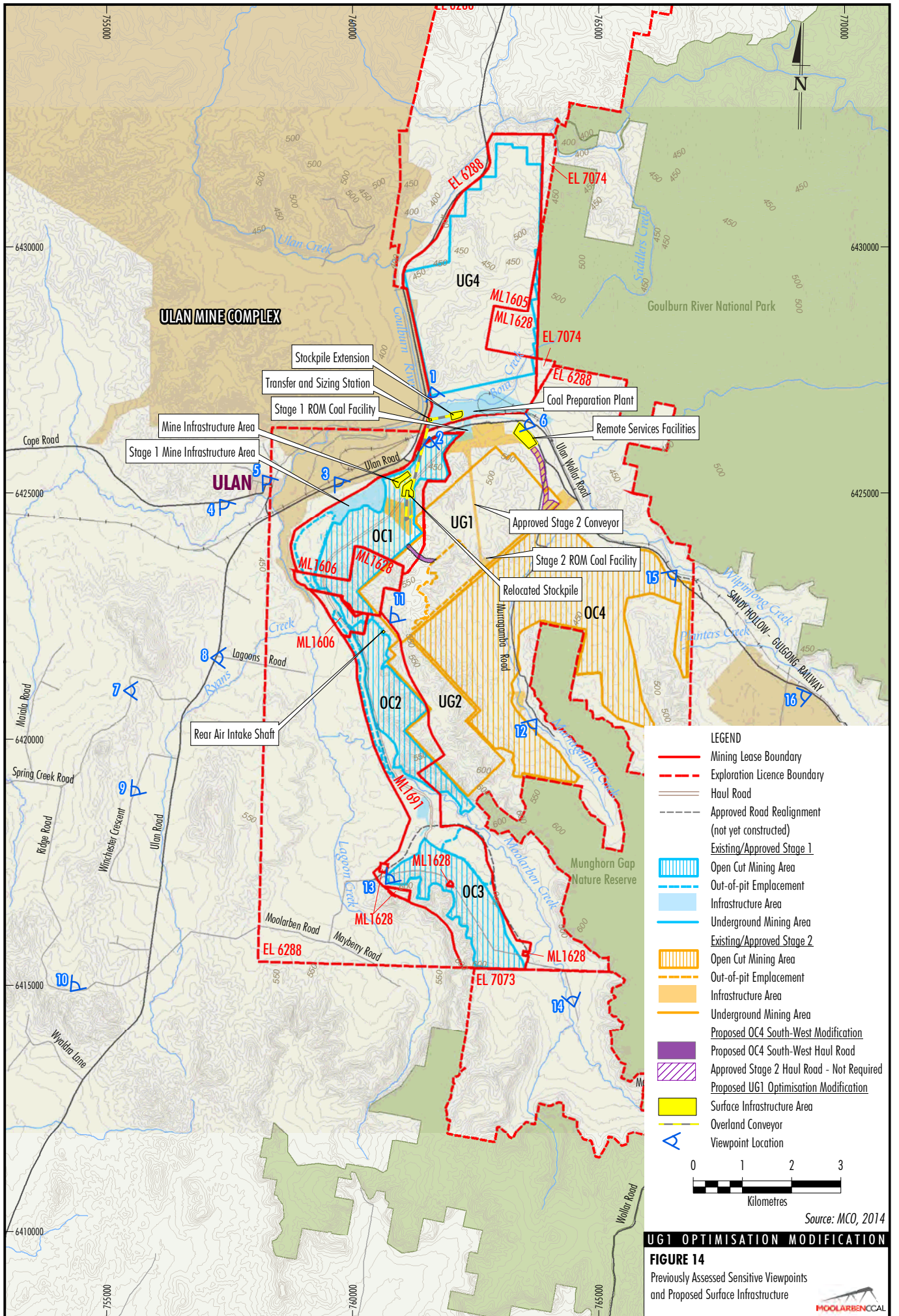
- Moolarben Coal Project Visual and Lighting Impact Assessment (O'Hanlon Design, 2006) which assessed the impacts of Stage 1 of the Moolarben Coal Project;
- Stage 2 Moolarben Coal Project Visual and Lighting Impact Assessment (O'Hanlon Design, 2008) which assessed the impacts of Stage 2 of the Moolarben Coal Project; and
- Moolarben Coal Project Stage 1 Optimisation Modification Visual Impact Assessment (EMM, 2013c) which assessed the impacts of Stage 1 Modification 9.

Key potential viewpoints assessed in previous visual impact assessments for the Moolarben Coal Complex included Ulan, Ulan Road, Ulan-Wollar Road, Ridge Road, Moolarben Road, Winchester Crescent and Cope Road (Figure 14).

The level of visual impact of the approved mine from potential viewpoints varies with the progress of the open cuts. Views of the Moolarben Coal Complex are unimpeded from Ulan Road and Ulan-Wollar Road and include the approved infrastructure, open cut pits, waste rock emplacements and progressively rehabilitated mine landforms.

O'Hanlon Design (2006) concluded that viewpoints around the Stage 1 infrastructure area (e.g. from Ulan Road and Ulan-Wollar Road) would be significantly impacted by Stage 1 of the Moolarben Coal Complex (Figure 14). O'Hanlon Design (2006) concluded that potential impacts at viewpoints located further south and into the rural residential areas would be significantly lower due to the distance between the mine and receiver and shorter duration of impact.

O'Hanlon Design (2008) predicted that visual impacts from Stage 2 of the Moolarben Coal Complex would be generally equivalent of those predicted for Stage 1 with the exception of views of the OC4 pit from Ulan-Wollar Road.





EMM (2013c) predicted that the potential visual impacts of the approved Moolarben Coal Complex prior to the implementation of any management and mitigation measures would be slight to moderate at the majority of the 12 viewpoints assessed (Figure 14), with some residents along Ridge Road predicted to experience moderate to substantial potential visual impacts (EMM, 2013c). However, the assessment concluded that with the implementation of mitigation measures (e.g. vegetative screening), the potential visual impact would be reduced to an acceptable level at relevant sensitive receivers (EMM, 2013c).

A total of 16 viewpoints have been assessed for Stages 1 and 2 of the Moolarben Coal Complex (Figure 14).

To ameliorate the visual impacts of Stage 1 of the Moolarben Coal Complex the following visual management measures would be implemented in accordance with the Stage 1 Project Approval Statement of Commitments (Attachment 1):

- Trees and shrubs would be planted to provide a visual screen:
  - to the switch and bore pads located adjacent to Saddlers Creek Road, where required.
  - along the southern edge of Cope Road, where views of OC1 Stage 1 Modification 9 extension areas would be possible, subject to landowner consent.
- Implementation of the measures to manage visual impacts associated with the OC1 and OC2 Stage 1 Modification 9 extension areas, such as:
  - vegetation screen planting, subject to landowner's consent, along the southern edge of Cope Road, in areas visually affected by direct views of the OC1 Stage 1 Modification 9 extension areas;
  - investigating the feasibility of targeted vegetation screen planting for affected properties along Ridge Road (with direct views from the residence to both OC1 and OC2 Stage 1 Modification 9 extension areas), to mitigate the visual and lighting impacts of OC1 and OC2 Stage 1 Modification 9 extension areas, subject to landowner consent;
- building-up out-of-pit embankments first so that continued operations are obscured by the embankment. Wherever possible out-of-pit emplacements around the perimeter would be established first, providing a visual screen while work is undertaken in the central part of the emplacement;
- seeding and grassing embankment outer faces visually exposed to private residents as soon as practically possible to soften the view;
- where possible, maintaining a strip of vegetation along the leading face of the ridgeline associated with the OC1 Stage 1 Modification 9 extension area to provide a visual screen to workings for as long as practical;
- use of operational screening measures such as landform re-establishment sequencing and lighting management; and
- progressive rehabilitation.
- As far as practically possible, and where mine safety allows, management protocols would be established and implemented to:
  - locate mobile lighting plant to be directed away from private residences;
  - direct stationary lighting sources below the horizontal to minimise potential light spill;
  - design lighting systems that minimise light spillage; and
  - avoid lighting of light coloured surfaces that have greater reflectivity.

The following mitigation and management measures were proposed for Stage 2 of the Moolarben Coal Complex:

- progressive rehabilitation of disturbed areas;
- revegetation of existing cleared lands to increase the vegetation within the existing landscape;
- retaining existing vegetation around Stage 2 infrastructure areas and on road fringes of OC4 where it is not required to be cleared for safety purposes;
- construction of bunding and planting along the edge of Ulan-Wollar Road in areas where it abuts OC4; and

- operation of night lighting in accordance with AS 4282: 1997 - *Control of the Obtrusive Effects of Outdoor Lighting* and AS/NZS 1158: 2010 – *Lighting for Roads and Public Spaces*.

The progressive rehabilitation of disturbed areas and revegetation species selection would be described in the Rehabilitation Management Plan.

#### 4.10.2 Environmental Review

The UG1 Optimisation Modification primarily involves the reconfiguration and extension of the longwall panels in UG1.

The UG1 Optimisation Modification also involves the construction of some supporting infrastructure, primarily within existing disturbance areas.

The reconfiguration of the longwall layout in UG1 would occur underground and would be of no visual consequence. The supporting infrastructure is unlikely to be seen from any private vantage points. There would be limited views of the supporting infrastructure from some public vantage points.

#### Visual Impact Assessment

A review of the potential visual impacts from the previously assessed sensitive viewpoints was undertaken for the UG1 Optimisation Modification (Figure 14). For each viewpoint, an assessment of intervening topography and vegetation was undertaken based on previous viewpoint simulations, landform contours and photos to determine whether there would be any views of the components of the UG1 Optimisation Modification from public or private vantage points.

A summary of the impacts predicted for the previously assessed viewpoints and potential visual impact under the UG1 Optimisation Modification is provided in Table 6.

It is unlikely that any privately owned residences would have direct views of the proposed UG1 Optimisation Modification infrastructure (Table 6).

Views of the proposed UG1 Optimisation Modification infrastructure would potentially be available from a small number of existing viewpoints along public roads (Table 6).

During mining operations, the UG1 Optimisation Modification infrastructure would be viewed by people travelling past the existing approved Ulan Mine Complex, Moolarben Coal Complex and Wilpinjong Coal Mine, which include direct views of infrastructure, active open cut pits and waste rock emplacement areas. Following the completion of mining operations, the UG1 Optimisation Modification infrastructure would be decommissioned and the landforms rehabilitated.

The UG1 Optimisation Modification would not change any of the approved post-mining landforms.

The scale and intensity of night-lighting for the UG1 Optimisation Modification would be similar to the approved Moolarben Coal Complex.

In the context of the existing/approved visual impacts and considering that there is no expected change in impacts for the previously assessed sensitive viewpoints (Table 6), there would be negligible change in visual impacts during mining operations due to the UG1 Optimisation Modification.

#### 4.10.3 Mitigation Measures and Management

The mitigation and management measures described in Section 4.10.1 would continue to be implemented at the Moolarben Coal Complex incorporating the UG1 Optimisation Modification.

### 4.11 OTHER ENVIRONMENTAL ASPECTS

#### 4.11.1 Land Resources

##### Site Inspection and Surveys

Site inspections and soil surveys were conducted in May and October 2014 and January 2015 to support a site verification certificate application for an area which included the proposed Remote Services Facilities, coal conveyor and land above the UG1 longwall panels. Twenty-two soil test pits were surveyed, including nine detailed soil samples which were sent for laboratory analysis.

The soil samples were assessed against the Biophysical Strategic Agricultural Land (BSAL) criteria in accordance with the *NSW Government Interim Protocol for Site Verification and Mapping of BSAL (Interim Protocol)* (NSW Government, 2013) and lodged in July 2014, November 2014 and February 2015. The soil sampling, visual observations and laboratory analysis indicated that no sites met the BSAL criteria.

**Table 6**  
**Summary of Visual Impacts**

Figure ID	Viewpoint Location	Significance of Approved Visual Impact (maximum during operations) <sup>1</sup>	Visual Impact with the UG1 Optimisation Modification
1	Ulan Road	High	Unchanged. Note that whilst the proposed sizing station and overland conveyor would be visible from Viewpoint 1, they are adjacent to the existing approved Ulan Mine Complex and Moolarben Coal Complex and would therefore be viewed in the context of a previously altered visual landscape (refer discussion above).
2	Ulan-Wollar Road (west)	High to very high	Unchanged. Note that whilst the overland conveyor and mine infrastructure would be visible from Viewpoint 2 and Viewpoint 3, they would be viewed in the context of the existing approved Moolarben Coal Complex, which includes infrastructure, an active open cut pit and haul roads in the immediate vicinity of the UG1 Optimisation Modification components (refer discussion below). Views of the infrastructure from sections of Ulan Road (e.g. at Viewpoint 3) would be screened by natural topography and/or intervening vegetation.
3	Ulan Road	Moderate to high	Unchanged. Note that whilst the proposed Remote Services Facilities would be visible whilst travelling along Ulan-Wollar Road (including from Viewpoint 6) they would be viewed by people travelling past the existing approved Wilpinjong Coal Mine, Ulan Mine Complex and Moolarben Coal Complex and would therefore be viewed in the context of a previously altered visual landscape (refer discussion above).
4	Cope Road	Moderate	Unchanged – direct views unlikely.
5	Ulan	Moderate to high	Unchanged – direct views unlikely.
6	Ulan-Wollar Road (rail loop and CHPP area)	High to very high	Unchanged. Note that whilst the proposed Remote Services Facilities would be visible whilst travelling along Ulan-Wollar Road (including from Viewpoint 6) they would be viewed by people travelling past the existing approved Wilpinjong Coal Mine, Ulan Mine Complex and Moolarben Coal Complex and would therefore be viewed in the context of a previously altered visual landscape (refer discussion above).
7	Ridge Road (north)	Moderate to very high	Unchanged – direct views unlikely.
8	Ulan Road (at Lagoons Road)	Slight	Unchanged – direct views unlikely.
9	Winchester Avenue	Moderate	Unchanged – direct views unlikely.
10	Ridge Road (south)	Low	Unchanged – direct views unlikely.
11	Carrs Gap Road <sup>2</sup>	High	N/A
12	Murragamba Valley <sup>2</sup>	High to very high	N/A
13	Moolarben Road (west)	High to very high	Unchanged – direct views unlikely.
14	Moolarben Road (south)	High to very high	Unchanged – direct views unlikely.
15	Ulan-Wollar Road (OC4 pit)	Moderate to high	Unchanged – direct views unlikely.
16	Ulan-Wollar Road (south)	Moderate to high	Unchanged – direct views unlikely.

Note 1: Maximum visual impact assessed under the Stage 1 and Stage 2 Moolarben Coal Project Visual & Lighting Impact Assessment (O'Hanlon Design, 2006; 2008) and/or Stage 1 Modification 9 Visual Impact Assessment (EMM, 2013c).

Note 2: Road currently subject to road closure application.

Therefore, Dr McKenzie (McKenzie Soil Management, 2014) concluded that the site verification certificate application area, which included the surface disturbance and underground mining areas associated with the UG1 Optimisation Modification (except for the rear air intake shaft which is within ML 1691) is not BSAL. The site verification certificate issued on 31 March 2015 (Attachment 3) verified the additional development areas associated with the UG1 Optimisation Modification as non-BSAL.

#### **Potential Impacts**

The UG1 Optimisation Modification would result in the disturbance of approximately 8.4 ha of additional land at the Moolarben Coal Complex. These disturbance areas would be rehabilitated post-mining.

Potential impacts on soils and land capability would also be associated with the following subsidence impacts:

- surface cracking; and
- ponding and changes in stream alignment.

Predicted subsidence impacts of the UG1 Optimisation Modification would be generally consistent with those for the approved Moolarben Coal Complex (Appendix A). Given the above, there is a low potential for impact to land capability due to the modified UG1 mine layout.

Based on the above and considering that there are currently no agricultural activities undertaken in this area, the potential impacts on land capability as a result of the UG1 Optimisation Modification would be minimal.

#### **Mitigation Measures, Management and Monitoring**

Land resource mitigation measures, management and monitoring would be conducted in accordance with an approved MOP and Rehabilitation Management Plan.

Rehabilitation of the Moolarben Coal Complex incorporating the UG1 Optimisation Modification is described in Section 3.11.

#### **4.11.2 Greenhouse Gas Emissions**

MCO calculates and reports annual greenhouse gas emissions and energy consumption from the Moolarben Coal Complex in accordance with the existing requirements of the Commonwealth National Greenhouse and Energy Reporting System (NGERS).

Greenhouse gas emissions for the Moolarben Coal Complex (incorporating Stages 1 and 2) were predicted in the Stage 1 Modification 9 EA by Todoroski Air Sciences (2013).

The annual average Scope 1 emissions for the approved Moolarben Coal Complex were estimated to be approximately 0.09 Mt of carbon dioxide equivalent (CO<sub>2</sub>-e), which was approximately 0.016% of Australia's estimated annual greenhouse gas emissions for October 2011 to September 2012 (Todoroski Air Sciences, 2013).

The predicted Scope 1 greenhouse gas emissions for the approved Moolarben Coal Complex were approximately 4.2 times lower than the Scope 1 emissions predicted for the originally approved Moolarben Coal Project Stage 1 (Todoroski Air Sciences, 2013).

Todoroski Air Sciences (2015a) assessed the potential increase in greenhouse gas emissions associated with the UG1 Optimisation Modification. It was concluded that as a result of the extraction of an additional 3.7 Mt of coal, the total greenhouse gas emissions over the life of the mine would increase by approximately 1% compared to the approved Moolarben Coal Complex (Appendix D).

Annual reporting of greenhouse gas emissions from the Moolarben Coal Complex would continue in accordance with the NGERS requirements, and the existing abatement measures would continue to be implemented.

The Moolarben Coal Complex greenhouse gas management system would provide the basis for identifying and implementing measures for minimising greenhouse gas emissions and capturing and/or using these emissions.

#### **4.11.3 Non-Aboriginal Heritage**

Non-Aboriginal Heritage Assessments were prepared for Stages 1 and 2 of the Moolarben Coal Project. Collectively, these studies assessed the impacts associated with the Moolarben Coal Complex disturbance areas, including the UG1 Optimisation Modification disturbance area.

An assessment undertaken by Veritas Archaeology and History Service in 2005 identified 54 non-Aboriginal heritage sites within or in close proximity to the Moolarben Coal Complex. The heritage survey identified places and relics consistent with the past agricultural and pastoral land use in vicinity of the Moolarben Coal Complex and associated social fabric (Wells Environmental Services, 2006). Numerous house and farm sites were located, together with former school sites, graves, surveyor marks, the old Lagoon Inn and retaining walls associated with the road to Wollar via Carrs Gap Road (Wells Environmental Services, 2006).

An assessment undertaken by Heritas Architecture in 2008 identified 11 non-Aboriginal heritage sites within the Stage 2 Project Area (Wells Environmental Services, 2008).

The Non-Aboriginal Heritage Assessments recommended that the Moolarben Coal Project (Stages 1 and 2) be carried out in accordance with a Heritage Management Plan that is prepared in consultation with the MWRC.

The 2005 and 2008 surveys identified one non-Aboriginal heritage site (Carrs Gap Road stone wall) above the UG1 underground mining area extension in the south-west. The approved Moolarben Coal Complex was assessed as having a high impact on this site.

Subsidence predictions for the UG1 Optimisation Modification indicate that the stone wall would be subject to a maximum predicted subsidence of 2,250 mm and maximum tilt and strain would be 2 mm/m and greater than 50 mm/m respectively (Appendix A). The stone wall is likely to be significantly impacted by the extraction of the UG1 longwall panels (Appendix A).

Management of potential subsidence impacts to the Carrs Gap Road stone wall would be described in the Extraction Plan. MCO would continue to implement its approved Heritage Management Plan<sup>11</sup> at the Moolarben Coal Complex incorporating the UG1 Optimisation Modification.

#### 4.11.4 Blasting

As there would be no change to open cut blast locations, sizes or frequencies as a result of the UG1 Optimisation Modification, there would be no additional blast impacts. Blasting would continue to be managed in accordance with the Blast Management Plan.

#### 4.11.5 Aquatic Ecology

No threatened fauna listed under the NSW *Fisheries Management Act, 1994* are likely to be affected by the UG1 Optimisation Modification as there is no aquatic habitat within the Modification area, and ephemeral watercourses nearby the UG1 Optimisation Modification areas are unlikely to provide potential aquatic habitat.

#### 4.11.6 Hazard and Risk

Preliminary Hazard Analyses (PHAs) were conducted for the Stage 1 Modification 9 EA and the Stage 2 PPR to assess the potential hazard and risk associated with the approved Moolarben Coal Complex. It is considered that the UG1 Optimisation Modification would not change the existing potential risks or hazard consequences identified in the PHAs as the proposed activities associated with the UG1 Optimisation Modification (e.g. underground mining activities, transport to site and on-site storage) are consistent with those for the approved Moolarben Coal Complex.

Notwithstanding, environmental management plans and monitoring programs would be reviewed, and where necessary, updated to include the UG1 Optimisation Modification and manage any associated environmental risks.

<sup>11</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Heritage Management Plan.

## 5 STATUTORY CONTEXT

This section outlines the statutory requirements relevant to the assessment of the UG1 Optimisation Modification. It also provides a consideration of the UG1 Optimisation Modification against the objects of the EP&A Act.

### 5.1 GENERAL STATUTORY CONSIDERATIONS

#### 5.1.1 State Legislation

##### ***Environmental Planning and Assessment Act, 1979***

The Moolarben Coal Project Stage 1 was approved under Part 3A of the EP&A Act by the NSW Minister for Planning on 6 September 2007 (Project Approval 05\_0117 [Attachment 1]). The Moolarben Coal Project Stage 2 was approved under Part 3A of the EP&A Act by the Planning Assessment Commission (as delegate of the NSW Minister for Planning) on 30 January 2015 (Project Approval 08\_0135 [Attachment 2]).

The Moolarben Coal Project Stage 1 and Stage 2 are 'transitional Part 3A projects' under clause 2 of Schedule 6A of the EP&A Act and therefore section 75W of the EP&A Act continues to apply to modifications to Project Approvals (05\_0117 and 08\_0135), despite its repeal<sup>12</sup>.

As outlined in Section 1.4, MCO consulted with the DP&E in May 2014 with regards to seeking the necessary approvals for the UG1 Optimisation Modification and based on this consultation, this EA has been prepared under section 75W of the EP&A Act.

Section 75W of the EP&A Act states:

##### **75W Modification of Minister's Approval**

(1) *In this section:*

**Minister's approval** means an approval to carry out a project under this Part, and includes an approval of a concept plan.

**modification of approval** means changing the terms of a Minister's approval, including:

(a) *revoking or varying a condition of the approval or imposing an additional condition of the approval, and*

(b) *changing the terms of any determination made by the Minister under Division 3 in connection with the approval.*

(2) *The proponent may request the Minister to modify the Minister's approval for a project. The Minister's approval for a modification is not required if the project as modified will be consistent with the existing approval under this Part.*

(3) *The request for the Minister's approval is to be lodged with the Director-General. The Director-General may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister.*

(4) *The Minister may modify the approval (with or without conditions) or disapprove of the modification.*

...

The EP&A Act and the *Environmental Planning and Assessment Regulation, 2000* (EP&A Regulation) set the framework for planning and environmental assessment in NSW. As noted above, the UG1 Optimisation Modification is to be assessed under section 75W (Part 3A) of the EP&A Act.

Section 5 of the EP&A Act describes the objects of the EP&A Act as follows:

(a) *to encourage:*

(i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*

(ii) *the promotion and co-ordination of the orderly and economic use and development of land,*

(iii) *the protection, provision and coordination of communication and utility services,*

(iv) *the provision of land for public purposes,*

(v) *the provision and co-ordination of community services and facilities, and*

(vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*

<sup>12</sup> Part 3A of the EP&A Act (as in force immediately before its repeal) continues to apply to and in respect of a transitional Part 3A project (including the Project Approvals [05\_0117 and 08\_0135]) under clause 3 of schedule 6A of the EP&A Act. The description and quotations of relevant references to clauses of Part 3A in this document are as if Part 3A of the EP&A Act is still in force.

- (vii) *ecologically sustainable development, and*
- (viii) *the provision and maintenance of affordable housing, and*
- (b) *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) *to provide increased opportunity for public involvement and participation in environmental planning and assessment.*

The UG1 Optimisation Modification is considered to be generally consistent with the objects of the EP&A Act, because it is a modification which:

- incorporates measures for the management and conservation of natural resources (Section 4);
- would enable more efficient recovery of underground coal and more efficient integration of mining operations across the complex;
- would allow activities to continue on Crown land above the UG1 Optimisation Modification area;
- would not affect the ongoing provision of community services and facilities;
- would result in no significant impact on threatened species, population and ecological communities or their habitats;
- allows continued development of the State's mineral resources (i.e. coal resources) in a manner that minimises environmental impacts through the implementation of the Moolarben Coal Complex Environmental Management Strategy (Section 2.15) and other measures (Section 4); and
- allows public involvement and participation through consultation activities (Section 1.4), which would be ongoing following the public exhibition of this EA document and DP&E assessment of the UG1 Optimisation Modification in accordance with the requirements of the EP&A Act.

### 5.1.2 Other State Legislation

In addition to the EP&A Act, the following NSW Acts may be applicable to the Moolarben Coal Complex, incorporating the UG1 Optimisation Modification:

- *Crown Lands Act, 1989;*
- *Fisheries Management Act, 1994;*

- *Heritage Act, 1977;*
- *Mine Subsidence Compensation Act, 1961;*
- *Mining Act, 1992;*
- *National Parks and Wildlife Act, 1974 (NPW Act);*
- *Native Vegetation Act, 2003;*
- *Protection of the Environment Operations Act, 1997 (PoEO Act);*
- *Roads Act, 1993;*
- *Threatened Species Conservation Act, 1995 (TSC Act);*
- *Water Act, 1912;*
- *Water Management Act, 2000;*
- *Work Health and Safety Act, 2011; and*
- *Work Health and Safety (Mines) Act, 2013.*

Relevant licences or approvals required under these Acts would continue to be obtained for the Moolarben Coal Complex as required. Key plans and licences that would require revision to incorporate the UG1 Optimisation Modification are outlined in Section 5.3.

Additional detail on the likely requirements under the some of the key Acts is provided in the subsections below.

#### ***Mining Act, 1992***

MCO lodged Mining Lease Application (MLA) 327 on 20 March 2009. MCO lodged MLA 331 on 21 April 2009. The grant of MLA 327 and MLA 331 would be required for the UG1 Optimisation Modification.

Under the *Mining Act, 1992*, environmental protection and rehabilitation are regulated by conditions of MLs, including requirements for the submission of a MOP prior to the commencement of operations, and subsequent AEMRs (or Annual Reviews).

The Moolarben Coal Complex MOP would be updated to include the proposed layout of the UG1 Optimisation Modification prior to the commencement of secondary extraction at UG1 (Section 5.3).

**Protection of the Environment Operations Act, 1997**

Construction and operations at the Moolarben Coal Complex are currently undertaken in accordance with an existing Environment Protection Licence (EPL 12932) issued under the PoEO Act.

The existing Moolarben Coal Complex is currently licensed under EPL 12932 to conduct “mining for coal” and “coal works” as defined in Schedule 1 of the PoEO Act.

The noise limits in EPL 12932 may require a variation as a result of the UG1 Optimisation Modification (Section 5.3.4).

**Water Management Act, 2000 and Water Act, 1912**

The *Water Management Act, 2000* and the *Water Act, 1912* contain provisions for the licensing, allocation, capture and use of water resources. Under the *Water Management Act, 2000*, water sharing plans are being introduced for water sources. Water sharing plans establish rules for sharing water between different users and between the various environmental sources (namely rivers or aquifers).

Licensing requirements under the *Water Management Act, 2000* and *Water Act, 1912* were evaluated as a component of the Stage 1 Modification 9 EA and Stage 2 PPR EA.

The UG1 Optimisation Modification would not materially change licensing requirements for the approved Moolarben Coal Complex (Section 4.2).

MCO would continue to obtain and hold licences required under the *Water Management Act, 2000* and *Water Act, 1912*.

**National Parks and Wildlife Act, 1974**

The NPW Act contains provisions for the protection and management of national parks, historic sites, nature reserves and Aboriginal heritage in NSW.

Section 75U(1) of the EP&A Act outlines authorisations that are not required for a transitional Part 3A project, including the Project Approvals (05\_0117 and 08\_0135). An Aboriginal heritage impact permit under section 90 of the NPW Act is not required for the Project Approvals (05\_0117 and 08\_0135), including the UG1 Optimisation Modification.

Notwithstanding, an ACHA for the UG1 Optimisation Modification has been undertaken in consultation with Registered Aboriginal Parties in accordance with the existing engagement system in place at the Moolarben Coal Complex (Section 4.7).

**Heritage Act, 1977**

The *Heritage Act, 1977* regulates the conservation of items listed on the State Heritage Register or subject to an interim heritage order.

Heritage related approvals under the *Heritage Act, 1977* are not required for the Project Approvals (05\_0117 and 08\_0135), including the UG1 Optimisation Modification.

MCO would continue to implement its approved Heritage Management Plan<sup>13</sup> for management of the Carrs Gap Road stone wall heritage site at the Moolarben Coal Complex incorporating the UG1 Optimisation Modification (Section 4.11.3).

**Threatened Species Conservation Act, 1995**

The TSC Act protects threatened species and provides a framework for the assessment of a development's impacts on threatened species and ecological communities.

The potential impact of the UG1 Optimisation Modification on threatened species, populations and ecological communities was assessed as part of the Flora and Fauna Impact Assessment (Appendix E). EcoLogical Australia (2015a) concluded that the UG1 Optimisation Modification would not have a significant impact on threatened species, populations and ecological communities (Section 4.5).

**5.1.3 Environmental Planning Instruments**

The Stage 1 EA and Stage 2 PPR EA provided a detailed consideration of the Moolarben Coal Complex against State environmental planning policies and local environmental plans.

State environmental planning policies and local environmental plans that may be relevant to the UG1 Optimisation Modification are discussed below.

<sup>13</sup> On 30 January 2015, Stage 2 and Stage 1 Modification 3 of the Moolarben Coal Project were approved by the Planning Assessment Commission (as delegate of the NSW Minister for Planning). To address the requirements of the Project Approvals (Attachments 1 and 2), MCO is preparing a complex-wide Heritage Management Plan.



**State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007**

The Mining SEPP regularises the various environmental planning instruments that previously controlled mining activities.

Part 3 of the Mining SEPP outlines some of the matters to be considered when determining development applications (noting that SEPPs are but one of a number of considerations that are required to be taken account of). Relevant clauses are discussed further below.

*Clause 12*

Clause 12 of the Mining SEPP requires that, before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:

- (a) *consider:*
  - (i) *the existing uses and approved uses of land in the vicinity of the development, and*
  - (ii) *whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and*
  - (iii) *any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and*
- (b) *evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and*
- (c) *evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).*

The UG1 Optimisation Modification would allow for the extraction of additional coal reserves and enable more efficient recovery of underground coal.

UG1 is located within the Project Application Areas in the Project Approvals (05\_0117 and 08\_0135). As such, the UG1 Optimisation Modification is compatible with the existing land use (i.e. coal mining).

The potential impacts of the UG1 Optimisation Modification on built features, natural features and vegetation as a result of mine subsidence are described in Appendices A and E and summarised in Sections 4.1 and 4.5.

MCO would, where practicable, implement a range of measures to avoid or minimise incompatibility of the UG1 Optimisation Modification with existing and future land uses in the area. This would be achieved through the implementation of the existing Moolarben Coal Complex Environmental Management Strategy (Section 2.15) and other measures (Section 4).

*Clause 12AA*

Clause 12AA of the Mining SEPP requires that:

- (1) *In determining an application for consent for development for the purposes of mining, the consent authority must consider the significance of the resource that is the subject of the application, having regard to:*
  - (a) *the economic benefits, both to the State and the region in which the development is proposed to be carried out, of developing the resource, and*
  - (b) *any advice by the Director-General of the Department of Trade and Investment, Regional Infrastructure and Services as to the relative significance of the resource in comparison with other mineral resources across the State.*
- (2) *The following matters are (without limitation) taken to be relevant for the purposes of subclause (1) (a):*
  - (a) *employment generation,*
  - (b) *expenditure, including capital investment,*
  - (c) *the payment of royalties to the State.*
- (3) *The Director-General of the Department of Trade and Investment, Regional Infrastructure and Services is, in providing advice under subclause (1) (b), to have regard to such matters as that Director-General considers relevant, including (without limitation):*
  - (a) *the size, quality and availability of the resource that is the subject of the application, and*
  - (b) *the proximity and access of the land to which the application relates to existing or proposed infrastructure, and*

- (c) *the relationship of the resource to any existing mine, and*
- (d) *whether other industries or projects are dependent on the development of the resource.*
- (4) *In determining whether to grant consent to the proposed development, the significance of the resource is to be the consent authority's principal consideration under this Part.*
- (5) *Accordingly, the weight to be given by the consent authority to any other matter for consideration under this Part is to be proportionate to the importance of that other matter in comparison with the significance of the resource.*
- (6) *To avoid doubt, the obligations of a consent authority under this clause extend to any application to modify a development consent.*

The UG1 Optimisation Modification would allow the recovery of approximately an additional 3.7 Mt of underground coal.

The UG1 Optimisation Modification would reduce the number of longwall mining equipment relocations from nine to five which would enable more efficient recovery of underground coal.

The proposed UG1 Optimisation Modification would improve the efficiency of integration of mining operations across the complex, access to the UG1 resource and transfer of underground coal to the CHPP area.

The UG1 Optimisation Modification would increase the approved operational workforce for the Moolarben Coal Complex from 440 personnel to approximately 667 personnel on average.

#### Clause 14

Clause 14(1) of the Mining SEPP requires that, before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the approval should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:

- (a) *that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,*

- (b) *that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,*
- (c) *that greenhouse gas emissions are minimised to the greatest extent practicable.*

In addition, clause 14(2) requires that, without limiting clause 14(1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programmes or guidelines concerning greenhouse gas emissions.

The potential impacts of the UG1 Optimisation Modification on groundwater and surface water resources are discussed in Sections 4.2 and 4.6, including measures to minimise potential impacts which are described in Sections 4.2.3 and 4.6.3.

The potential impacts of the UG1 Optimisation Modification on threatened species and biodiversity are described in Section 4.5, including measures to minimise potential impacts which are described in Sections 4.5.3.

Existing greenhouse gas abatement measures at the Moolarben Coal Complex and the potential increase in greenhouse gas emissions associated with the UG1 Optimisation Modification are described in Section 4.11.2.

#### Clause 15

Clause 15 of the Mining SEPP requires that:

- (1) *Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.*
- (2) *Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.*
- (3) *The consent authority may refuse to grant consent to development if it is not satisfied that the development will be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.*

The UG1 Optimisation Modification would allow for the extraction of additional coal reserves and enable more efficient recovery of underground coal.

It is in MCO's financial interest to maximise the efficiency of coal recovery and minimise the generation of coal reject which requires disposal. The UG1 Optimisation Modification would not produce any additional coal rejects.

#### Clause 17

Clause 17 of the Mining SEPP requires that before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the approval should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development. In particular, the consent authority must consider whether conditions of the consent should:

- (a) *require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or*
- (b) *require waste generated by the development or the rehabilitation to be dealt with appropriately, or*
- (c) *require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under section 145C of the Act and the Contaminated Land Management Act 1997), or*
- (d) *require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.*

The approved rehabilitation objectives and concepts for the UG1 Optimisation Modification would remain generally unchanged.

The Rehabilitation Management Plan and MOP would be revised to incorporate the UG1 Optimisation Modification.

#### **State Environmental Planning Policy No. 33 (Hazardous and Offensive Development)**

Clause 13 of SEPP 33 requires the consent authority, in determining a development application for a potentially hazardous or a potentially offensive industry, to consider:

- (a) ...
- (c) *in the case of development for the purpose of a potentially hazardous industry—a preliminary hazard analysis prepared by or on behalf of the applicant, and*

- (d) *any feasible alternatives to the carrying out of the development and the reasons for choosing the development the subject of the application (including any feasible alternatives for the location of the development and the reasons for choosing the location the subject of the application)...*

The UG1 Optimisation Modification would not change existing potential risks or hazard consequences as the proposed activities associated with the UG1 Optimisation Modification are consistent with those for the approved Moolarben Coal Complex (Section 4.11.6).

Notwithstanding, environmental management plans and monitoring programmes would be reviewed, and revised by MCO to include the UG1 Optimisation Modification and manage any associated environmental risks (if necessary).

#### **State Environmental Planning Policy No. 44 (Koala Habitat Protection)**

SEPP 44 requires the consent authority for any development application in certain LGAs to consider whether land subject to the application is "potential Koala habitat" or "core Koala habitat".

EcoLogical Australia (Appendix E) considers the UG1 Optimisation Modification area comprises potential Koala habitat, but does not comprise core Koala habitat.

#### **State Environmental Planning Policy No. 55 (Remediation of Land)**

SEPP 55 aims to provide a State-wide planning approach to the remediation of contaminated land. Under SEPP 55, planning authorities are required to consider the potential for contamination to adversely affect the suitability of the site for its proposed use.

The Stage 2 EA determined that potentially contaminated sites associated with prior land uses may be encountered within the Stage 2 Project Application Area (including UG1) associated with sheep dips, workshops, and machinery sheds used for fuel, chemical and fertiliser storage and landfills. Where any potentially contaminated sites are found during construction or operation of Stage 2 these will be assessed and appropriate management strategies formulated to treat or remediate the site.

Under clause 7(2), before determining an application for consent to carry out development that would involve a change of use of land, the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned, carried out in accordance with the contaminated land planning guidelines.

Because the UG1 Optimisation Modification is within the Project Application Areas in the Project Approvals (05\_0117 and 08\_0135), no change of use is proposed and no preliminary land contamination investigation is required.

### **Mid-Western Regional Local Environmental Plan 2012**

The Moolarben Mine Complex is located wholly within the Mid-Western Regional LGA and is covered by the *Mid-Western Regional Local Environmental Plan 2012* (MWR LEP).

Clause 2.3(2) of the MWR LEP relevantly provides:

*The consent authority must have regard to the objectives for development in a zone when determining a development application in respect of land within the zone.*

As outlined above, the consent authority for transitional Part 3A projects is the Minister for Planning.

Under the MWR LEP, the UG1 Optimisation Modification area includes land zoned as RU1 – Primary Production and E3 – Environmental Management.

#### *Permissibility*

Under the MWR LEP, underground mining is permissible with consent in the RU1 Zone and is prohibited in the E3 Zone.

Clause 4 of the Mining SEPP relevantly provides:

#### **4 Land to which Policy applies**

*This Policy applies to the State.*

Clause 5(3) gives the Mining SEPP primacy where there is any inconsistency between the provisions in the SEPP and the provisions in any other environmental planning instrument (subject to limited exceptions).

Clause 5(3) relevantly provides:

#### **5 Relationship with other environmental planning policies**

- (3) *... if this Policy is inconsistent with any other environmental planning instrument, whether made before or after this Policy, this Policy prevails to the extent of the inconsistency.*

The practical effect of clause 5(3) for MCO is that if there is any inconsistency between the provisions of the Mining SEPP and those contained in the MWR LEP, the provisions of the Mining SEPP will prevail.

Clauses 6 and 7 of the Mining SEPP provide what types of mining development are permissible without development consent and what types are permissible only with development consent. In this regard, clause 7(1) states:

#### **7 Development permissible with consent**

##### **(1) Mining**

*Development for any of the following purposes may be carried out only with development consent:*

- (a) *underground mining carried out on any land,*

...

The term ‘underground mining’ in the Mining SEPP is given an extended definition in clause 3(2) as follows:

#### **Underground mining means:**

- (a) *mining carried out beneath the earth’s surface, including bord and pillar mining, longwall mining, top-level caving, sub-level caving and auger mining, and*
- (b) *shafts, drill holes, gas and water drainage works, surface rehabilitation works and access pits associated with that mining (whether carried out on or beneath the earth’s surface),*

*but does not include open cut mining.*

The effect of clause 7(1), in conjunction with the operation of clause 5(3) of the Mining SEPP, is that notwithstanding any prohibition contained in the land use table of the MWR LEP, the UG1 Optimisation Modification is permissible with consent.

#### *RU1 – Primary Production*

Under the MWR LEP the objectives of the RU1 – Primary Production zone are:

- *To encourage sustainable primary industry based production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

- *To maintain the visual amenity and landscape quality of Mid-Western Regional by preserving the area's open rural landscapes and environmental and cultural heritage values.*
- *To promote the unique rural character of Mid-Western Regional and facilitate a variety of tourist land uses.*

The UG1 Optimisation Modification is consistent with the general objectives of RU1 – Primary Production zone as mining is a primary industry and the UG1 Optimisation Modification would enable more efficient recovery of underground coal and more efficient integration of mining operations across the complex.

The UG1 Optimisation Modification would not significantly alter the compatibility of the Moolarben Mine Complex with adjoining land uses and there would be negligible change in visual impacts during mining operations due to the UG1 Optimisation Modification.

### *E3 – Environmental Management*

Under the MWR LEP the objectives of the E3 – Environmental Management zone are:

- *To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.*
- *To provide for a limited range of development that does not have an adverse effect on those values.*
- *To manage development within the water supply catchment lands of Windamere and Burrendong Dams, to conserve and enhance the district's water resources.*

Subsidence impact mitigation measures have been developed for the UG1 Optimisation Modification to minimise impacts to significant surface features, including ecological and cultural values (Section 4).

The UG1 Optimisation Modification would not have a significant impact on threatened species, populations and ecological communities with the implementation of the proposed management measures (Section 4.5). No Aboriginal heritage sites are anticipated to be significantly impacted as a result of subsidence associated with the UG1 Optimisation Modification (Section 4.7).

### **5.1.4 Commonwealth Legislation**

The current Stage 1 mining operations are undertaken in accordance with Approval Decisions (EPBC 2007/3297) granted on 24 October 2007 (and varied by notice on 25 February 2009 and 11 May 2010) and (EPBC 2013/6926) granted on 13 November 2014 under the EPBC Act.

The current Stage 2 mining operations are undertaken in accordance with Approval Decision (EPBC 2008/4444) granted on 18 May 2015 under the EPBC Act.

The potential impacts of the UG1 Optimisation Modification on flora and fauna have been assessed in Appendix E and summarised in Section 4.5. The assessment indicates that there would be no significant impact on threatened species, populations and communities and migratory species listed under the EPBC Act as a result of the UG1 Optimisation Modification.

The potential impacts of the UG1 Optimisation Modification on water resources have been assessed in Appendices B and F and summarised in Sections 4.2 and 4.6. These assessments indicate:

- The UG1 Optimisation Modification would have no material impact on stream baseflow or natural river leakage for any nearby stream.
- Up to 6.5 metres of additional drawdown is predicted in the Ulan Seam in the north-eastern extents of UG1, which is minor from a regional perspective.
- There would be no other discernible change in drawdown resulting from the UG1 Optimisation Modification.
- No third-party groundwater users would be affected by the UG1 Optimisation Modification, in terms of the minimal harm considerations of the Aquifer Interference Policy.
- The net loss of groundwater from the alluvium to underlying rock strata associated with the UG1 Optimisation Modification is expected to be negligible.
- There would not be any significant change to approved impacts on drainage lines due to the UG1 Optimisation Modification, with only minor predicted increases in ponding.
- Water monitoring and management for the Moolarben Coal Complex would continue to be conducted in accordance with the approved Water Management Plan.

## 5.2 NSW GOVERNMENT POLICY

### 5.2.1 Strategic Regional Land Use Plan

As part of the Strategic Regional Land Use Policy, the NSW Government has introduced a 'Gateway Process' for the upfront assessment of the impacts of State Significant mining and coal seam gas proposals on Strategic Agricultural Land (NSW Government, 2012b).

The Strategic Regional Land Use Policy and the 'Gateway Process' apply to new State Significant Development applications or modifications for mining projects located outside of existing mining lease areas (NSW Government, 2012b).

MLA 327 and MLA 331 have not been granted for the area that covers the UG1 Optimisation Modification area and therefore the Gateway Process and Strategic Regional Land Use Policy have been considered for the UG1 Optimisation Modification.

The Upper Hunter Strategic Regional Land Use Plan does not map any Strategic Agricultural Land for the development areas associated with the UG1 Optimisation Modification.

Soil surveys of the development areas associated with the UG1 Optimisation Modification were undertaken in May and October 2014 and January 2015 to assess the land against the *Interim Protocol for site verification and mapping of biophysical strategic agricultural land* (NSW Government, 2013).

A site verification certificate issued on 31 March 2015 (Attachment 3) verified the additional development areas associated with the UG1 Optimisation Modification as non-BSAL.

### 5.2.2 Aquifer Interference Policy

The AIP (NSW Government, 2012a) has been developed by the NSW Government as a component of the NSW Government's Strategic Regional Land Use Policy. The AIP applies State-wide and details water licence and impact assessment requirements.

The AIP has been developed to ensure equitable water sharing between various water users and proper licensing of water taken by aquifer interference activities such that the take is accounted for in the water budget and water sharing arrangements. The AIP would also enhance existing regulation, contributing to a comprehensive framework to protect the rights of all water users and the environment in NSW.

The *Water Management Act, 2000* defines an aquifer interference activity as that which involves any of the following:

- *the penetration of an aquifer;*
- *the interference with water in an aquifer;*
- *the obstruction of the flow of water in an aquifer;*
- *the taking of water from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations; and*
- *the disposal of water taken from an aquifer in the course of carrying out mining or any other activity prescribed by the regulations.*

A Groundwater Assessment (Appendix B) has been prepared in consideration of the AIP and the key conclusions are summarised below.

#### **Water Source**

The AIP requires all water taken by aquifer interference activities to be accounted for within the extraction limits set by the relevant Water Sharing Plan. Surface water and alluvial groundwater resources within the vicinity of the Moolarben Coal Complex are managed under the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (the HUAWSP).

Licensing to account for water taken from the coal seams and adjacent hardrock under the *NSW Water Act, 1912* is also required for any additional mine inflows from the porous rock aquifer.

#### **Baseline Groundwater Conditions**

Baseline groundwater conditions and the existing observed impacts of the approved Moolarben Coal Complex, Ulan Mine Complex and Wilpinjong Coal Mine on alluvial and porous rock aquifers are discussed in Appendix B.

Potential impacts on alluvial and unregulated water sources have been modelled using the latest version of the approved RPS Aquaterra model (2012) for the Moolarben Coal Complex to ensure consistency of predictions (Appendix B). This groundwater model was developed in consultation with key regulators.

The potential impacts of the UG1 Optimisation Modification have been assessed by making comparisons between the approved and modified UG1 mine layout for the Moolarben Coal Complex.

### **Licensing Requirements**

The UG1 Optimisation Modification results in a negligible increase in total maximum water take from the water sources in the HUAWSP (Appendix B).

Using a conservative approach, the additional licensing requirement as a result of the UG1 Optimisation Modification for the porous rock groundwater source under the *Water Act, 1912* is up to 69 ML/year (Appendix B).

The total predicted take would remain within MCO's existing licensed allocation.

The numerical groundwater model would be refined over progression of the mine life in order to more accurately calculate the post-closure licensing requirements associated with the Moolarben Coal Complex.

### **Minimal Impact Considerations**

The AIP establishes minimal impact considerations for highly productive and less productive groundwater.

There is no 'highly productive' groundwater, as defined under the Aquifer Interference Policy, mapped in the vicinity of the Moolarben Coal Complex (Appendix B). The nearest 'highly productive' groundwater is a portion of the alluvial aquifer associated with Wilpinjong Creek downstream of the Wilpinjong Coal Mine (Appendix B).

An assessment of the UG1 Optimisation Modification against the minimal impact considerations in the AIP was conducted as part of the Groundwater Assessment.

The Groundwater Assessment concluded that the Modification is within the 'Level 1' minimal impact considerations outlined in the AIP (Appendix B).

## **5.3 APPROVALS, LICENCES AND PLANS**

### **5.3.1 Project Approval Conditions**

Condition 6, Schedule 2 of Project Approval (05\_0117) (Attachment 1) stipulates:

6. *The Proponent shall not extract more than:*
  - (a) ...
  - (b) *4 million tonnes of ROM coal from the underground mining operations of the project in any calendar year.*

Condition 7, Schedule 2 of Project Approval (08\_0135) (Attachment 2) stipulates:

7. *The Proponent shall not extract more than:*
  - (a) ...
  - (b) *4 million tonnes of ROM coal from the underground mining operations of the Moolarben mine complex in any calendar year.*

MCO is seeking to amend Condition 6, Schedule 2 of Project Approval (05\_0117) and Condition 7, Schedule 2 of Project Approval (08\_0135) as a component of the UG1 Optimisation Modification to read:

- ... *The Proponent shall not extract more than:*
- ...
- (b) **8 million tonnes** of ROM coal from the underground mining operations of the Moolarben mine complex in any calendar year.

Condition 8, Schedule 2 of Project Approval (05\_0117) (Attachment 1) stipulates:

8. *The Proponents shall ensure that:*
  - (a) ...
  - (b) *no more than 5 laden trains leave the Moolarben mine complex each day.*

MCO is seeking to amend Condition 8, Schedule 2 of Project Approval (05\_0117) as a component of the UG1 Optimisation Modification to read:

8. *The Proponents shall ensure that:*
  - (a) ...
  - (b) *no more than 7 laden trains leave the Moolarben mine complex per day on average when calculated over any calendar year; and*
  - (c) *no more than 9 laden trains leave the Moolarben mine complex on any one day.*

Following implementation of the Ulan Road Strategy, MCO is seeking to remove Condition 58(a), Schedule 3 of Project Approval (05\_0117). Notwithstanding, MCO would seek to minimise any interaction between traffic generated by the Moolarben Coal Complex and the school buses operating on Ulan Road, while also seeking to spread the generated traffic through the day and minimise interaction with traffic generated by the other mines in the area.

In addition to the above, the following components of the Project Approvals (05\_0117 and 08\_0135) would require amendment to incorporate the proposed layout of the UG1 Optimisation Modification:

- Appendix 2 (General Layout of Project) of Project Approval (05\_0117);
- Appendix 2 (General Layout of Project) of Project Approval (08\_0135);
- Appendix 4 (Underground Mine Layout and Location of Sensitive Natural and Man Made Features) of Project Approval (08\_0135); and
- Appendix 8 (Aboriginal Heritage) of Project Approval (08\_0135).

### **5.3.2 Extraction Plan**

An Extraction Plan would be prepared for UG1, incorporating the UG1 Optimisation Modification, prior to the commencement of second workings in accordance with Condition 5, Schedule 4 of Project Approval (08\_0135).

### **5.3.3 Mining Operations Plan**

The Moolarben Coal Complex MOP would be updated to include the proposed layout of the UG1 Optimisation Modification prior to the commencement of secondary extraction at UG1.

### **5.3.4 Environment Protection Licence Conditions**

Condition L5 of EPL 12932 provides noise limits for the Moolarben Coal Complex. This condition may require variation as a result of the UG1 Optimisation Modification as described in Section 4.3.

### **5.3.5 Management/Monitoring Plans**

Some management plans may require revision to reflect updated environmental management measures or changes to Project Approval conditions resulting from the UG1 Optimisation Modification.

These are expected to include the Water Management Plan, Biodiversity Management Plan, Heritage Management Plan and Rehabilitation Management Plan.



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