

# Moolarben Coal Project Stage I Optimisation Modification



## Response to Submissions

Prepared for Moolarben Coal Operations Pty Limited | September 2013



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Prepared for Moolarben Coal Operations Pty Limited | 10 September 2013

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## Moolarben Coal Project - Stage 1 Optimisation Modification (MOD 9)

Final

Report J12090RP1 | Prepared for Moolarben Coal Operations Pty Limited | 10 September 2013

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Prepared by **John Arnold**

Approved by **Luke Stewart**

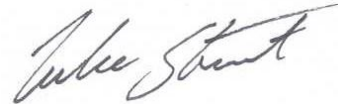
Position Project Manager

Position Project Director

Signature



Signature



Date 10 September 2013

Date 10 September 2013

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### Document Control

Version	Date	Prepared by	Reviewed by
1	5/8/2013	John Arnold	Luke Stewart
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# 1 Introduction

## 1.1 Background

The Moolarben Coal Project (MCP) is an approved open cut and underground coal mine in the Western Coalfields of New South Wales (NSW), approximately 40 km north-east of Mudgee (Figure 1.1). The MCP is managed and operated by Moolarben Coal Operations Pty Limited (MCO), a wholly owned subsidiary of Yancoal Australia Ltd (Yancoal).

MCO operates Stage 1 of the MCP, which was granted Major Project Approval 05\_0117 (MP 05\_0117) under Part 3A of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) in 2007. MCO proposes to modify MP 05\_0117, to enable amongst other things, the extension of open cut mining. A description of the proposed modification is given in Section 1.3 below.

An environmental assessment (EMM 2013) (EA) was prepared which describes the proposed modification in detail, assesses its potential impacts and proposes measures that will be implemented, subject to approval, to avoid, minimise and/or offset potential impacts. The EA was publicly exhibited and submissions invited. This report responds to matters raised in submissions.

It is noted that a Major Project application for Stage 2 of the MCP, MP 08\_0135, is currently being assessed by the NSW Department of Planning and Infrastructure (DP&I). If approved, Stage 2 will consist of one open cut pit, Open Cut 4, two underground mines, Undergrounds 1 and 2, and associated additional infrastructure. Stage 2 is proposed to be developed adjacent to, and in conjunction with, Stage 1. Together with the application for Stage 2, MCO also applied to modify the Stage 1 approval, to enable both Stages 1 and 2 to be operated as an integrated mining complex. This modification application is currently being assessed by DP&I.

## 1.2 Current approval

MP 05\_0117 has been modified on seven occasions to make administrative changes, changes to infrastructure and allow construction of a borefield. The main components of the approved MCP Stage 1 comprise:

- three open cut pits, referred to as Open Cuts 1, 2 and 3, which have an approved combined maximum extraction rate of 8 million tonnes per annum (Mtpa) of run of mine (ROM) coal;
- one underground mine, referred to as Underground 4, which has an approved maximum extraction rate of 4 Mtpa of ROM coal;
- coal handling, processing, rail loop, load-out and water management infrastructure; and
- associated facilities including offices, bathhouses, workshops and fuel storages.

To date, mining has occurred within Open Cut 1 only, commencing at the south-western perimeter and progressing in a north-easterly direction.

### 1.3 Proposed modification

The main components of the proposed modification comprise:

- the extension of mining within Open Cuts 1 and 2;
- the construction and operation of additional water management infrastructure; and
- a minor change to the rehabilitation sequencing and final landform.

The Stage 1 approval period will be extended to accommodate the proposed modification.

The proposed modification will allow access to substantial coal reserves that are economically viable in today's market but are restricted by the current approval.

A summary of the approved Stage 1 operation and the proposed modification is provided in Table 1.1 below. No other changes are proposed under the modification. There will be no change to the maximum annual rate of coal production or extraction, mining methods, employee numbers, operating hours, coal handling and processing, coarse rejects and tailings management, site access or external coal transport.

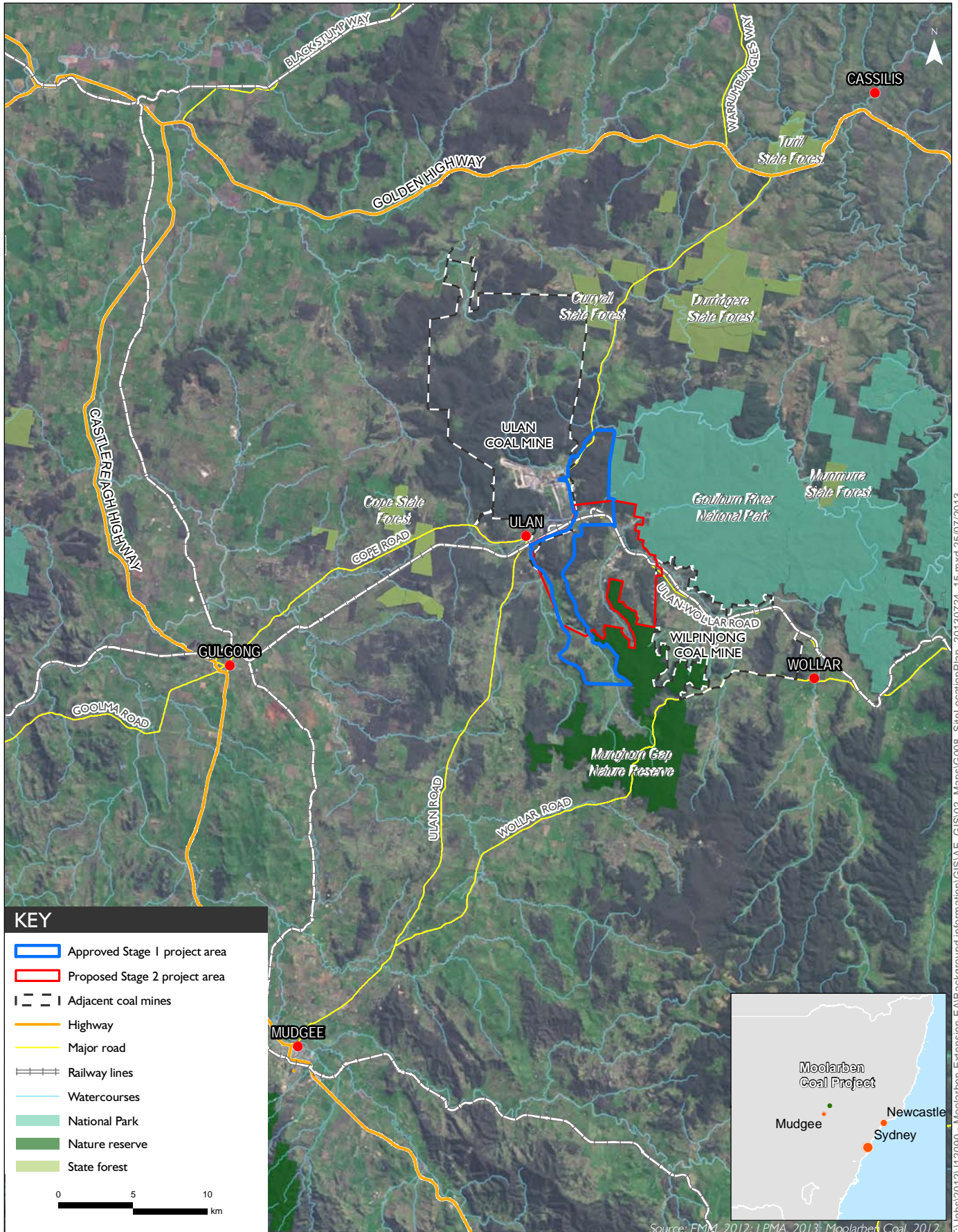
The proposed modification elements are shown in Figure 1.2.

**Table 1.1 Stage 1 approval and proposed modifications**

<b>Project aspect</b>	<b>Current Stage 1 approval</b>	<b>Proposed modification</b>
Total life of mine coal production (product coal)	10 Mtpa	No change
Total life of mine ROM coal extraction from open cut and underground mining	12 Mtpa	No change
ROM coal extraction limit from open cut mining	8 Mtpa	No change
ROM coal extraction limit from underground mining	4 Mtpa	No change
Life of mine	21 years (2028)	Five year extension (2033)
Operating hours	Seven days per week, 24 hours per day	No change
Number of employees (operation only)	Operational workforce of 317 full time positions	No change
Mining methods	Open cut truck and shovel operation	No change
Coal handling and processing	Coal from the open cut pits transferred by truck and conveyor to the coal handling and preparation plant (CHPP). Coal from Underground 4 transferred to the CHPP by conveyors. Up to 12 Mtpa of ROM coal processed	No change
Overburden emplacement	8,431,021 cubic metres (m <sup>3</sup> )	An additional 1,480,537 m <sup>3</sup> of in-pit overburden emplacement

**Table 1.1 Stage 1 approval and proposed modifications**

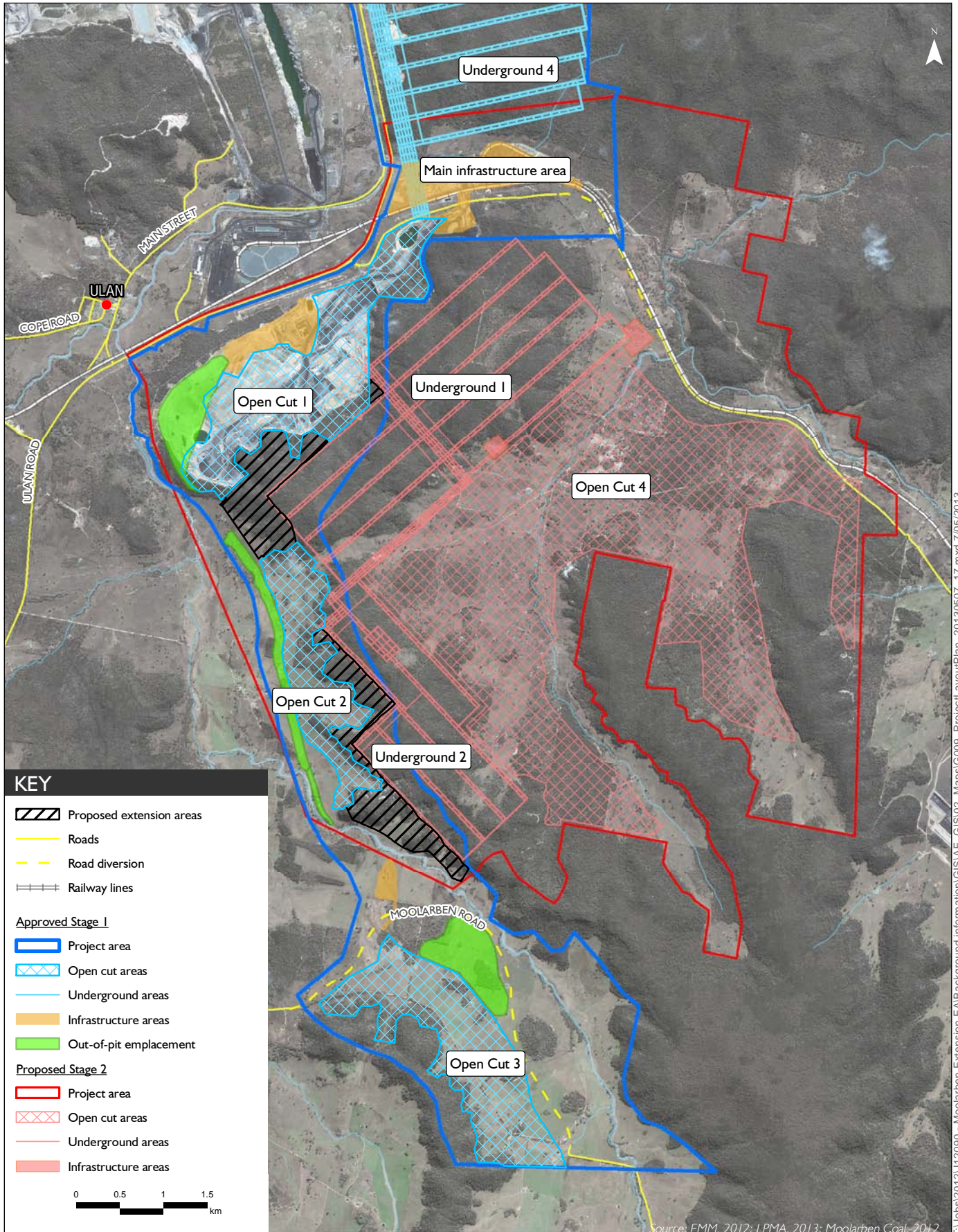
<b>Project aspect</b>	<b>Current Stage 1 approval</b>	<b>Proposed modification</b>
Coarse rejects and tailings management	Reject back hauled and placed in overburden. Fines recovered at the CHPP either added to product or coarse reject streams. Emergency tailings storage adjacent to the CHPP	No change
Final voids	One void in each of Open Cuts 1, 2 and 3	No change
Site access	Access to main infrastructure area and Underground 4 from Ulan to Cassilis Road north of rail line; and access to open cut pits from Ulan to Wollar Road south of the rail line	No change
External coal transport	Four daily coal train paths	No change



### MCP location plan

Moolarben Coal Project - Stage I Optimisation Modification

Figure I.1



## 1.4 Project approval process

MCO is seeking approval for a proposed modification to MP 05\_0117 under Section 75W of the EP&A Act. As part of the approval process an EA was prepared that assessed the potential environmental, social and economic impacts of the proposed modification.

A stakeholder engagement program was implemented throughout the preparation of the EA that included consultation with relevant government agencies, special interest groups, service providers and the local community. The EA addressed all matters raised during this engagement process.

The EA was publicly exhibited from 29 May to the 21 June 2013, advertised in the Mudgee Weekly and Mudgee Guardian. Copies of the EA were displayed at the DP&I, Mid-Western Regional Council (MWRC), and Nature Conservation Council of NSW. Electronic copies of the EA were available on DP&I and MCO websites. Hard and electronic copies were also sent to government agencies as nominated by DP&I.

DP&I received 194 submissions. Of these, 137, or approximately 71%, were in support of the proposed modification. The remaining 57 submissions, or approximately 29%, either objected to or included general statements about the proposed modification and/or coal mining. A summary of the submissions is provided in Chapter 2 and Appendices A to C.

This report has been prepared to respond to matters raised in submissions.

The determining authority for the proposed modification is the NSW Minister for Planning and Infrastructure, although in this instance, as more than 25 public submissions objecting to the proposal have been received, the determination will be delegated to the NSW Planning Assessment Commission (PAC).

The DP&I will prepare the Director-General's Environmental Assessment Report and conditions if approval is recommended. These will be provided to the PAC, which will determine whether the proposed modification will be approved and, if so, the conditions of approval.

## 2 Summary of submissions and response methodology

This chapter summarises the submissions received on the EA for the proposed modification and the approach adopted to respond to the matters raised in the submissions. All submissions are available on the DP&I's website:

[http://majorprojects.planning.nsw.gov.au/index.pl?action=view\\_job&job\\_id=5983](http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=5983)

### 2.1 Submissions received

Submissions were received from the following government authorities, special interest groups, and the community:

- NSW government authorities (eight submissions):
  - Roads and Maritime Services (RMS);
  - Department of Primary Industries (DPI) (submissions received from four agencies):
    - Crown Lands;
    - Office of Water (NOW);
    - Agriculture; and
    - Fisheries.
  - Office of Environment and Heritage (OEH);
  - Environment Protection Authority (EPA); and
  - MWRC.
- Special interest groups (five submissions):
  - Hunter Environment Lobby Inc.;
  - Rylstone District Environment Society;
  - Nature Conservation Council of NSW;
  - Central West Environment Council; and
  - Xstrata Coal.
- Community (181 submissions).

MCO acknowledges and thanks all stakeholders for taking the time to review the EA and submit a response.

## 2.2 Response methodology

All submissions received were reviewed and summarised into the tables presented in Appendix A to C. Submissions were numbered and assigned a code (Government (G); special interest groups (S); community (C)). Where responses were required, each matter was assigned a category, such as 'water' or 'air quality', as well as an identification code representing the respondent and matter number, for example C6.1 refers to the first matter raised in community submission number six.

A response to the matters raised in submissions has been prepared with the assistance of EMM and the technical specialists that undertook the assessments in the EA. Responses are provided in the following chapters. Specific matters raised are summarised in italics with a response provided below each matter.

## 2.3 Submissions of support

As previously mentioned, over 70% of submissions received were in support of the proposed modification. Submissions of support were received from local community members, including individuals, local and regional businesses, and MCO employees.

Of note, where an address was provided, the vast majority of these were from community members and businesses in the local area, including Ulan, Cook's Gap, Mudgee and Gulgong.

Submissions in support of the proposed modification do not require a response. However, it is important to note the reason why support was given. Two main reasons for support of the proposed modification and MCP generally, were:

- the positive impact on the economy, through direct and indirect employment; and
- the positive impact on the local community, through ongoing financial contributions in support of local charities, sporting and community groups, schools and hospitals.

Other reasons of support include the following:

- the positive impact the MCP has on the town of Mudgee and the surrounding community;
- the financial and employment security during times of uncertainty in the local economy that the proposed modification will provide;
- the high standards of environmental management and proactive rehabilitation strategies currently employed by MCO;
- the effective management and monitoring of environmental issues such as noise, dust and water by MCO;
- MCO's commitment to the local community; and
- financial contributions made by MCO to local roads and infrastructure.

A number of businesses both locally and outside the region noted that they value their association with MCO.

All matters raised in the submissions of support are summarised in Appendix A.



## 2.4 EA amendments and revision

One submission (submission S5) received from Xstrata Coal notes that two of the figures in the EA (Figure ES.1 and Figure 1.1) do not depict the correct Ulan Coal Mine project approval boundary and two other figures (Figure ES.3 and Figure 10.3) do not display all of the Ulan Coal Mine biodiversity offset areas.

Xstrata Coal's comments are noted and, accordingly, these figures have been amended. The site location plan (Figure 1.1 above) displays the correct Ulan Coal Mine project approval boundary and the offset areas which relate to other mines have been removed from the biodiversity offset plan provided in Appendix D.

It is also noted that the indicative open cut mine plan for year 16 (Figure 4.4 in the EA) does not show the full extent of rehabilitation. Figure 4.4 has been amended and is also provided in Appendix D.

As described in Chapter 5, the Biodiversity Offset Strategy and proposed Biodiversity Offset Package has been modified subsequent to the exhibition of the EA. The strategy has been modified based on the outcomes of additional consultation with OEH and to account for the minor additional disturbance associated with the proposed surface water management infrastructure upgrades (described in Section 3.9). The revised strategy is provided in Appendix E.

## 2.5 Request for additional information

Following exhibition of the EA, the DP&I has requested clarification and additional information in relation to the matters listed below.

1. *The surface water management infrastructure upgrades agreed to with the EPA and now the subject of a specific pollution reduction program (PRP) under Environment Protection Licence (EPL) 12932, in the vicinity of the CHPP and rail loop area.*

Section 3.5 of this report includes consideration of the surface water management infrastructure upgrades required by the EPA under a specific surface water management PRP.

2. *The changes to surface water management infrastructure proposed for Open Cut 1, 2 and 3 (including number, location and size of sediment dams) and how this compares to that described in the Stage 1 EA and approved under MP 05\_0117.*

The Stage 1 EA (Section 5.7 and Appendix 6) described the general concepts of water management to be implemented at the MCP Stage 1. This included implementation of diversion drains, drainage swales and sedimentation ponds to manage clean and dirty rainfall run-off from across the site. The Stage 1 EA surface water assessment was undertaken on the basis that erosion and sediment control measures were to be adopted as part of the detailed construction documentation designed in accordance with relevant government and industry guidelines, including the 'Blue Book'. The location of surface water management infrastructure was shown conceptually in Figures 8A to 8E in Appendix 6 of the Stage 1 EA, with the results of the water balance modelling guiding the conceptual sizing of the relevant infrastructure. Notwithstanding, the sizing of sedimentation dams assumed a maximum dam depth of 2.5 m with sufficient holding capacity to store runoff from a design 20 year recurrence storm based on an average wet year and maximum storage time of 90 days.

In accordance with Schedule 3 Condition 34 of MP 05\_0117 a detailed Water Management Plan (WMP) was prepared in consultation with relevant government authorities, approved by the Director-General (DG) of the DP&I and is being implemented at the MCP Stage 1. The WMP comprises a site water balance, an erosion and sediment control plan, a surface water monitoring plan, a groundwater monitoring plan and a surface and groundwater response plan. The WMP relates exclusively to the CHPP/rail loop infrastructure area and Open Cut 1, the current areas of operation.

Revised and updated water balance modelling has been used to update the proposed water management infrastructure requirements for managing surface water runoff for Open Cuts 1, 2 and 3. This was described and illustrated in the surface water assessment (Appendix I of the MOD9 EA). While the basic principles of surface water management remain the same (for example, diverting as much clean water as possible around the site and maintaining separation of clean and dirty water) the revised sizing of sediment dams is based on the 90<sup>th</sup> percentile 5 day rainfall depth in accordance with current OEH guidelines (as discussed in Section 3.1 below). A comparison of approved and proposed CHPP/rail loop area surface water management upgrades required by the EPA under a specific surface water management PRP is presented in Section 3.5.

As required by Schedule 2 Condition 8A of MP 05\_0117, MCO will review and revise its WMP, as necessary, to accommodate the proposed modification. The revised plan will include further detailed description of the surface water management infrastructure and be updated in consultation with the EPA, NOW and Department of Trade & Investment and submitted to the DG for approval.

3. *The staging of open cut mining as now proposed and how this compares to that described in the Stage 1 EA and approved under MP 05\_0117.*

Table 2.1 below provides a comparison of the staging of open cut mining between that described in the Stage 1 EA and that contemplated in the MOD9 application. It is noted that the proposed Stage 1 open cut mine schedule (Table 4.5 of the Stage 1 EA) was based on an assumed maximum ROM coal production rate of 8 Mtpa, with extraction occurring over an indicative 12 year time frame. Both the MOD3 (the MOD3 application is yet to be determined) and MOD9 applications contemplate the concurrent operation of the approved Stage 1 project with the proposed Stage 2 project. Note MOD9 is standalone proposal required in part as a contingency for delays in the approval of the Stage 2 project. Notwithstanding, DP&I requested the assessment of noise and dust impacts associated with the MOD9 proposal contemplate the cumulative impacts of the combined Stage 1 and Stage 2 developments to enable the assessment of probable worst case impacts (refer to Section 1.5 of the MOD9 EA).

Mine staging presented below for the Stage 1 MOD9 proposal assumes a maximum ROM coal production rate of 13 Mtpa from open cut mining across the complex (ie Stage 1 and 2 combined). Under this situation, extraction of the Stage 1 open cut coal resource would generally occur at a slower rate than that described in the Stage 1 EA due to the concurrent operation of Stage 2 open cut mining. Notwithstanding, access to the additional coal reserves sought in the current application (MOD9) would further extend the time frame over which open cut coal is extracted from the Open Cut 1, 2 and 3 mines under the Stage 1 only operating scenario. Note that for the Stage 1 only scenario open cut ROM coal extraction would remain limited to 8 Mtpa as currently approved.

It is further noted that mine planning and coal extraction scheduling is a dynamic process which needs to respond to a number of factors including (but not limited to) geology, contract sales volumes and market conditions. Hence, mine schedules put forward in planning application documents are only indicative. In the course of operational implementation, alternative mine plans and mining methods may be utilised such as those currently approved under MP 05\_0117, as modified, provided that in all cases the environmental impacts remain within the envelope of effects assessed in this report. For example, should Stage 2 not proceed, the MCP would continue to be operated generally in accordance with the mine plans

presented in the Stage 1 EA, however with mining areas varied to include the proposed extension areas, again provided that environmental impacts remain within the envelope of effects approved under MP 05\_0117 as modified.

**Table 2.1 Indicative Stage 1 open cut mine staging**

Stage 1 EA				Stage 1 MOD9 EA			
Year	Open Cut 1	Open Cut 2	Open Cut 3	Year	Open Cut 1	Open Cut 2	Open Cut 3
1	█				█		
2	█				█		
3	█				█		
4	█				█		
5	█				█		
6	█				█		
7	█	█		1*	█		
8		█		2	█		
9		█	█	3	█		
10			█	4	█		
11			█	5	█	█	
12				6		█	
13				7		█	
14				8		█	
15				9		█	
16				10		█	
17				11		█	
18				12		█	
19				13		█	
20				14		█	
21				15		█	
				16		█	
				17		█	
				18		█	█
				19			█
				20			█
				21			█

\* Year 1 currently equates to 2013

Note: The revised open cut mine staging contemplates the concurrent operation of the proposed Stage 2 Open Cut 4 mine.

- The extension of the Stage 1 approval time frame being sought considering that the Stage 1 modification 3 (MOD3) application seeks approval to extend the life of the mine (specifically the operation of the Stage 1 infrastructure) to align with the proposed 24 year life of the proposed Stage 2 Project.

The extension of mine life being sought aligns with that contemplated in the MOD3 application, which seeks to modify Stage 1 to enable the approved Stage 1 project infrastructure to receive, handle, store and load coal from the proposed Stage 2 project.

When the Stage 1 MOD3 application was made the required approval period extension was contemplated to be to 2033, although the ultimate aim was to tie the Stage 1 Approval period to that of the Stage 2 Approval. Delays in the assessment and approval process for Stage 2 now means this time frame has extended from 2033 to 2037. Hence the extension of time being sought under this modification application (ie MOD9) is the same as that sought for the MOD3 application, that now being to 2037. This is to ensure a consistent approval period for Stage 1 whether MOD9 is approved prior to MOD3 or vice versa.

5. *The shape of the proposed final landform post open cut mining and how this compares to that generally described in the Stage 1 EA and approved under MP 05\_0117.*

Figure 4.7 in the MOD9 EA has been amended to include a Stage 1 approved landform line. The revised figure is provided in Appendix D.

6. *The requirement for additional noise modelling and assessment.*

A detailed noise and vibration study was included in the MOD9 EA (EMM 2013b). However, this did not include the final years of mining in the existing approved Open Cut 3 (notionally Year 24 of mine operations for the modified proposal). This omission was justified on the premise that the proposed modification will not change the existing approved operations for Open Cut 3, albeit that the scheduling of Stage 1 open cut operations will be extended as a result of the proposed mine extensions and concurrent operation of Stage 1 and Stage 2 (see item 3 above).

At the request of the DP&I the noise assessment has now been extended to include an additional noise impact assessment scenario for Year 24 operations with mining notionally occurring in the southern part of Open Cut 3. The additional noise assessment has been prepared as an addendum to the MOD9 noise and vibration study and is provided in Appendix G. The outcomes of this assessment are discussed in Section 6.1 below.

## 3 Surface water

### 3.1 Assessment approach

#### **Submissions – C19.10, G4.3, G4.4, G8.7**

The above submissions raise matters in relation to the surface water study (WRM 2013) (EA Appendix I) of the proposed modification.

*The NSW Office of Water (NOW) notes that an increased volume of surface water will be intercepted as a result of the proposed modification; however, it is not clear how this water will be accounted for. NOW requires MCO to estimate the volumes of water taken from both surface water, including rainfall runoff, and groundwater from each water source to determine licensing requirements.*

As discussed in Section 4.4 of the surface water study, the proposed modification will result in the capture of runoff from an additional 140 ha of the Moolarben Creek catchment. This corresponds to an average annual runoff loss of 35 mega litres per year (ML/year). The affected catchment area will be mined through, forming part of the open cut pit. As rehabilitation progresses, runoff from the rehabilitated area will be collected in Sediment Dam OC2E (refer Figure 6.1 of the surface water study) which is solely for the capture, containment and recirculation of mine affected water consistent with best management practice to prevent the contamination of a water source.

The proposed modification will not require an approval for this dam under the *Water Management Act 2000* due to the application of section 75U(1)(h) of the *EP&A Act*. In addition, there is an exemption from the requirement for a water access licence in respect of this capture of surface runoff, pursuant to clause 18(1) of the *Water Management (General) Regulation 2011*.

*NOW requires MCO to develop strategies on how to manage the surface and groundwater in a modified landform, and should also update the Water Management Plan (WMP) to accommodate the proposed modification.*

MCO is fully committed to the development of strategies to effectively manage the surface and groundwaters in the modified landform. These strategies will be consistent with existing water management practice for the site, with disturbed area runoff collected in sediment dams and retained on site for recycling under most climatic conditions. Details of proposed additional water management infrastructure are provided in the surface water study. As per the statement of commitments in Chapter 21 of the EA, MCO will review and revise its WMP as necessary, to accommodate the proposed modification. The revised plan will be updated in consultation with relevant government authorities (including NOW) and submitted to the Director-General of Planning and Infrastructure for approval.

The groundwater response to this matter is provided in Section 4.4.

*The EPA notes that the surface water study provides that sediment dam volumes have been based on a settling zone volume based on the 90<sup>th</sup> percentile 5-day duration rainfall (35.6mm) where the settling zone equals 50% of the sediment volume. The EPA considers that the sediment dam volumes should be sized with a conservative approach, that is, the sediment dams will only overflow during extreme rainfall events, at most one to two spills per year. As such, the EPA considers that the sediment dam volumes should be based on a 95<sup>th</sup> percentile 5-day rainfall duration.*

The surface water study for the proposed modification has been based on the existing sediment dam sizes for infrastructure already constructed. Sizing of new sediment dams has been based on the 90<sup>th</sup> percentile 5-day rainfall depth, which is in accordance with OEH (previously the Department of Environment and Climate Change (DECC)) guidelines, *Managing Urban Stormwater, Soils and Construction, Volume 2E Mines and Quarries*, (DECC 2008) for receiving environments with 'standard' sensitivity.

The results of the water balance simulation show that for the approved operation (Table 6.14 of the surface water study), average spill days per year for all sediment dams is less than 1. This is within the conservative range preferred by the EPA (at most one to two spills per year). Under the proposed modification the predicted total spill volume is reduced by about 15% (refer Table 6.16 of the surface water study).

It should be noted that MCO has reviewed its existing surface water infrastructure for the approved Stage 1 CHPP and rail loop area in consultation with the EPA and this is now the focus of a specific water management PRP required under EPL 12932. This is further discussed in Section 3.5 below.

## 3.2 Water quality

**Submissions** – S2.2, S2.3, S4.32, S4.33, S4.35, C3.4, C5.8, C9.4, C10.3, C10.4, C14.4, C15.6, C16.4, C17.3, C18.6, C19.16, C19.8, C19.18, C21.2, C25.5, C25.7, C25.8, C26.5, C27.4, C28.8, C29.5, C31.3, C32.8, C32.3, C33.6, C35.1, C35.3, C37.7, C38.2, C38.7, C39.4, C39.22, C39.24, C39.25, C41.3, C42.4, C44.1

*The above submissions principally raise the potential for adverse impacts on the water quality of the Goulburn River from the proposed modification and existing approved operations. Specific matters include the proximity of the proposed extension areas and overburden dumps to Moolarben Creek, and the increase of sediment and salinity levels and pollution events. One submission states that it is not acceptable to merely monitor and document the decline in the health of the river systems.*

The surface water study indicates that the proposed Stage 1 mine site water management strategy and infrastructure, including the proposed modification, will have a negligible impact on the quality of surface runoff and receiving waters. The modified in-pit overburden emplacements are located outside of the Moolarben Creek flood extent and water from disturbed areas will be managed in accordance with MCO's WMP.

Modelling undertaken for the surface water study has considered the performance of the site water management system under the full range of historical climatic conditions and shows that the proposed modification will reduce the potential for, and overall volume of, overflows from sediment dams during rainfall events that exceed the required government and industry design standard.

*One submission notes that the review of baseline water quality monitoring data for receiving water concludes upstream and downstream water quality parameters were 'fairly consistent', and turbidity 'generally exceeds Australian and New Zealand Environment Conservation Council (ANZECC) trigger values' at most sites (page 16/17 surface water study). These conclusions were based on the simplistic analysis of maximum, minimum and average data and as such misrepresent upstream and downstream river water quality. A representative range of percentiles is a more meaningful and comparable guide to determine baseline conditions in this dynamic stream system that can be subject to external point source discharges that skew the data range. The downstream turbidity of river flow is normally <10 NTU (+90 percentile) well within the ANZECC guidelines for upland rivers. The maximum Electrical Conductivity (EC) of 1,680 microsecond per centimetre ( $\mu\text{S}/\text{cm}$ ) and 1,560  $\mu\text{S}/\text{cm}$  apparently recorded at The Drip (SW01) and Drip Picnic Area (SW02) respectively are examples of a spurious reading due to a point source mine water discharge and should be identified as such.*

Additional information regarding the two individual EC readings referenced in the above submission is provided below.

- The reading of 1,680  $\mu\text{S}/\text{cm}$  at The Drip (SW01) was recorded in the field on 22 December 2009. However, the corresponding results from a more accurate laboratory analysis indicate a reading of 837  $\mu\text{S}/\text{cm}$ .
- The reading is reported in the 2009/10 MCP AEMR as a monitoring event triggered by rainfall, and appears to be the first rainfall event since 1 September 2009.
- The field measured EC at SW02 was 1,260  $\mu\text{S}/\text{cm}$ , with a laboratory result of 870  $\mu\text{S}/\text{cm}$ .
- There were no licensed or unlicensed discharges from the MCP at this time.
- Ulan Coal Mine was discharging under its environment protection licence (EPL) with an EC of approximately 300  $\mu\text{S}/\text{cm}$ .
- The reading of 1,560  $\mu\text{S}/\text{cm}$  was recorded at The Drip Picnic Area (SW02) on 12th July 2006. No laboratory results were available for this reading.
- The MCP had not been approved and there was no development on the site associated with the mine proposal at this time.
- Ulan Coal Mine was discharging under its EPL at approximately 1,100  $\mu\text{S}/\text{cm}$ , which is within its EPL limit of 1,200  $\mu\text{S}/\text{cm}$ .
- EC recorded at SW01 at this time was 1,320  $\mu\text{S}/\text{cm}$ .

Based on the above information, the MCP was not responsible for either of these elevated salinity readings.

Further detail on the results of the surface water quality monitoring program are provided below.

Figures 3.1 to 3.6 show the surface water quality monitoring results presented as a percentile plot, for the parameters total suspended solids (TSS) and EC. MCO operates the MCP in accordance with conditions of EPL 12932, issued by the EPA under the *Protection of the Environment Operations Act 1997*. Licence conditions are developed for pollution prevention and monitoring, and cleaner production through recycling and reuse and the implementation of best practice, and include amongst other environmental aspects, conditions relating to water quality. The current EPL concentration limit (100<sup>th</sup> percentile) for each parameter is also shown on the figures. Refer to Figure 2.7 of the surface water study for the location of surface water monitoring points. Tables 3.1 and 3.2 show a summary of the 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile values at each monitoring location for TSS and EC, respectively.

**Table 3.1 Summary of receiving water monitoring results - TSS**

Monitoring Location and dates	Count	90 <sup>th</sup> percentile	TSS (mg/L)	
			50 <sup>th</sup> percentile	10 <sup>th</sup> percentile
SW1 (Feb05-Sep12)	124	77	3	2
SW2 (Feb05-Sep12)	134	67	4	2
SW10 (Jan10-Sep12)	40	28	4	2
SW11 (Oct08-Sep12)	72	302	56	3
SW8 (Feb05-Sep12)	97	69	10	2
SW9 (Feb05-Sep12)	99	59	15	3
SW5 (Feb05-Sep12)	136	70	7	2
SW7 (Feb05-Sep12)	100	21	4	2
SW12 (Oct08-Sep12)	79	344	12	2

**Table 3.2 Summary of receiving water monitoring results – EC**

Monitoring Location	Count	90 <sup>th</sup> percentile	EC (µS/cm)	
			50 <sup>th</sup> percentile	10 <sup>th</sup> percentile
SW1 (Feb05-Sep12)	125	984	670	296
SW2 (Feb05-Sep12)	135	1,200	740	374
SW10 (Jan10-Sep12)	40	124	73	18
SW11 (Oct08-Sep12)	72	364	130	60
SW8 (Feb05-Sep12)	98	5,036	3,495	2,019
SW9 (Feb05-Sep12)	100	5,372	4,140	1,470
SW5 (Feb05-Sep12)	147	1,144	735	337
SW7 (Feb05-Sep12)	101	5,608	3,360	1,740
SW12 (Oct08-Sep12)	80	788	415	76

#### i Total Suspended Solids

Review of the monitoring results indicates the following.

- The 10<sup>th</sup> percentile value is very similar for all monitoring stations, approximately 2-3 milligrams per litre (mg/L). Note that 2 mg/L is the TSS detection limit.



- The upstream monitoring stations at Moolarben Creek (SW8, SW9) and Lagoon Creek (SW7) have a 50<sup>th</sup> percentile TSS value of 4 to 15 mg/L, and a 90<sup>th</sup> percentile value of 21 to 69 mg/L. Lagoon Creek has a lower TSS for all percentiles than Moolarben Creek.
- Moolarben Creek adjacent to the mine (SW5) has 50<sup>th</sup> and 90<sup>th</sup> percentile TSS values of 7 and 70 mg/L, respectively. These values are similar to the upstream Moolarben Creek values.
- Goulburn River adjacent to the mine (SW12) has a TSS 50<sup>th</sup> percentile value of 12 mg/L, and a 90<sup>th</sup> percentile value of 344 mg/L. The 50<sup>th</sup> percentile value is within the range of the Moolarben Creek upstream 50<sup>th</sup> percentile values; however the 90<sup>th</sup> percentile is higher. (Note there is no monitoring data for Sportsmans Hollow Creek upstream of the Moolarben Creek confluence).
- Bora Creek has higher suspended solids concentrations downstream (SW11) of MCO's licensed discharge location, compared to upstream (SW10) of the discharge location. Additionally, the catchment upstream of SW10 is essentially undisturbed, whereas catchment runoff directed to SW11 includes runoff from cleared areas and roads which may contribute to the observed difference in water quality.
- The Goulburn River monitoring stations downstream of the site (SW1, SW2) are downstream of the licensed discharge location for Ulan Coal Mine and downstream of the confluence with Ulan Creek. SW1 is further downstream than SW2 and includes additional inflows from Spring Gully and Bobadeen Creek. The TSS 50<sup>th</sup> percentile values are 3-4 mg/L, and the 90<sup>th</sup> percentile values are 67-77 mg/L. These are similar to the upstream Moolarben Creek values (SW8, SW9).

## ii Electrical Conductivity

Review of the monitoring results indicates the following.

- The upstream monitoring stations on Moolarben Creek (SW8, SW9) and Lagoon Creek (SW7) have the highest recorded EC values of all the monitoring stations, with 10<sup>th</sup> percentile values approximately 1,500 to 2,000  $\mu\text{S}/\text{cm}$ , 50<sup>th</sup> percentile values approximately 3,400 to 4,100  $\mu\text{S}/\text{cm}$ , and 90<sup>th</sup> percentile values of greater than 5,000  $\mu\text{S}/\text{cm}$ .
- The Goulburn River monitoring stations downstream of the site (SW1, SW2) have 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile ECs of approximately 370, 740 and 1,200  $\mu\text{S}/\text{cm}$ , respectively. These values are very similar to the values recorded at Moolarben Creek adjacent to the mine (SW5).
- Bora Creek has elevated electrical conductivity downstream (SW11) of MCO's licensed discharge location compared to upstream (SW12) of the discharge location. However the downstream Bora Creek (SW11) 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile values are lower than the 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile values recorded at all other monitoring locations in Moolarben Creek or the Goulburn River.

With respect to Moolarben Creek, TSS downstream (SW 5) is similar to recorded values upstream (SW8 and SW9). EC downstream of the mine is significantly lower than upstream. Modelling results indicate that the proposed modification will reduce the total volume of overflows from sediment dams to Moolarben Creek compared to what would occur without the proposed modification.

TSS on the Goulburn River is lower downstream than near the mine site. However, EC is higher downstream than near the mine site. Note that the water quality downstream along the Goulburn River near The Drip is affected by landuse across the entire upstream catchment.

EC and TSS in Bora Creek are higher downstream of the MCP than upstream.

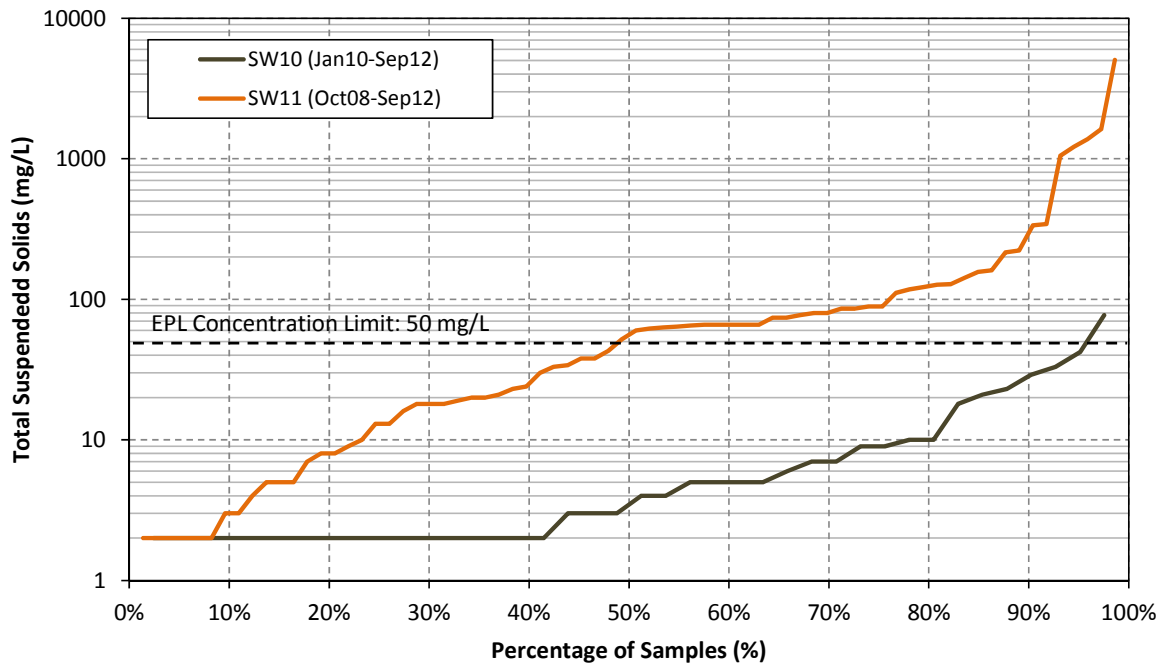


Figure 3.1 Bora Creek total suspended solids percentile plot

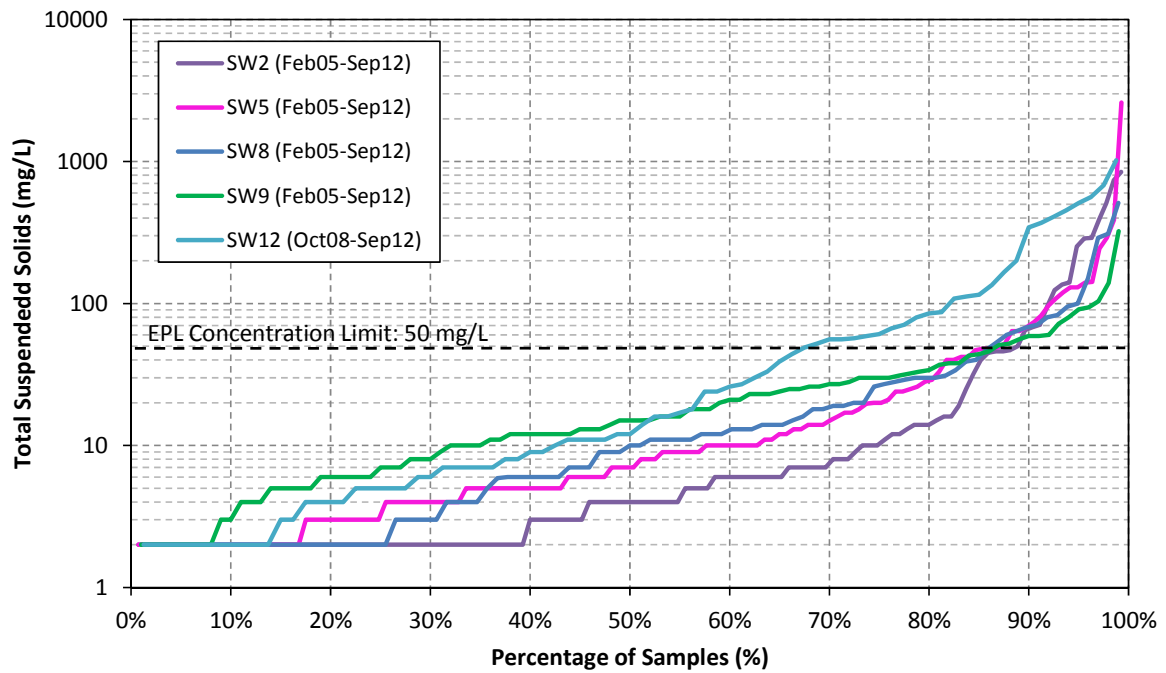


Figure 3.2 Moolarben Creek and Goulburn River total suspended solids percentile plot

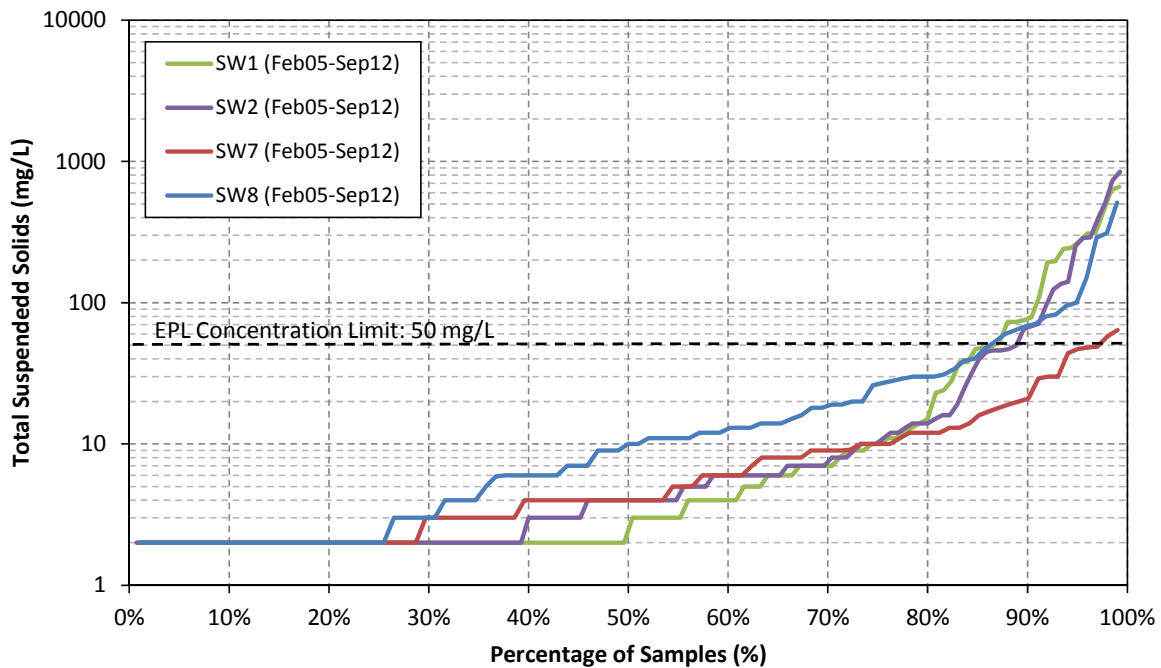


Figure 3.3 Moolarben Creek, Lagoon Creek (upstream) and Goulburn River (downstream) total suspended solids percentile plot

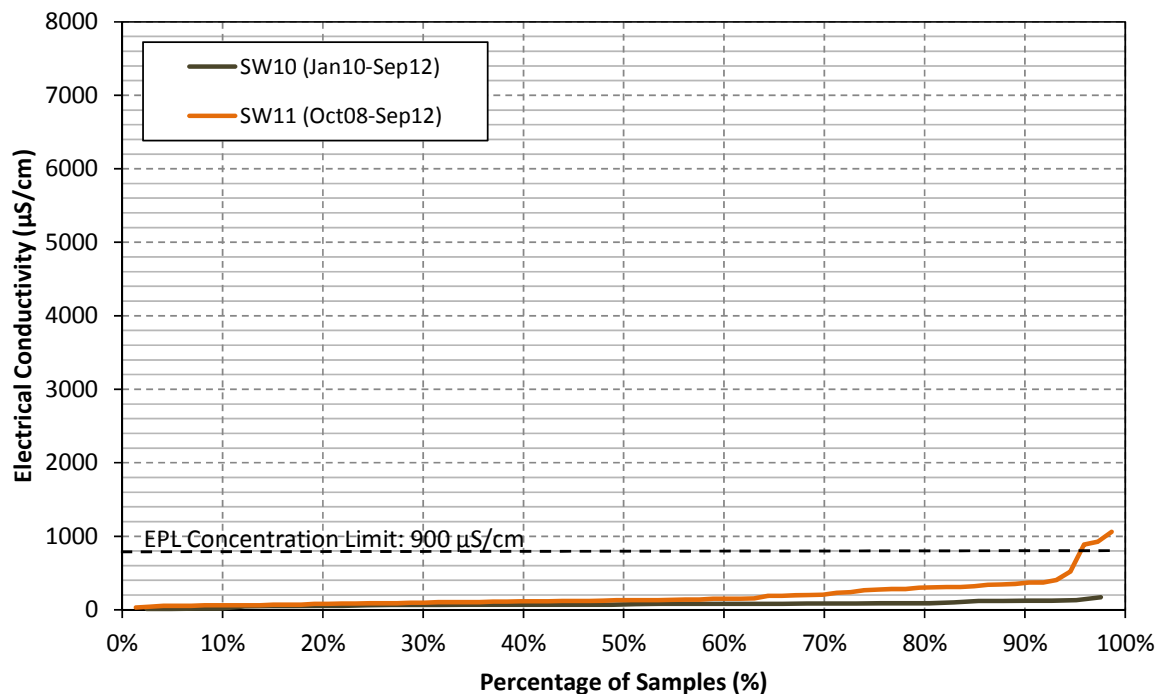


Figure 3.4 Bora Creek electrical conductivity percentile plot

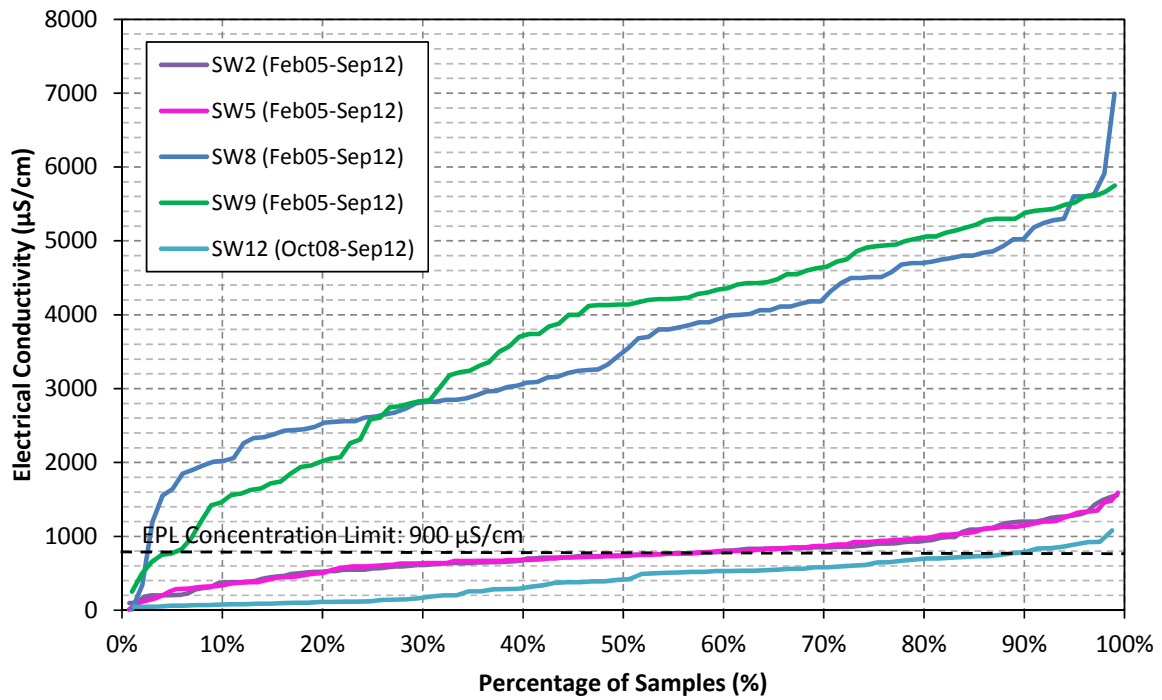


Figure 3.5 Moolarben Creek and Goulburn River electrical conductivity percentile plot

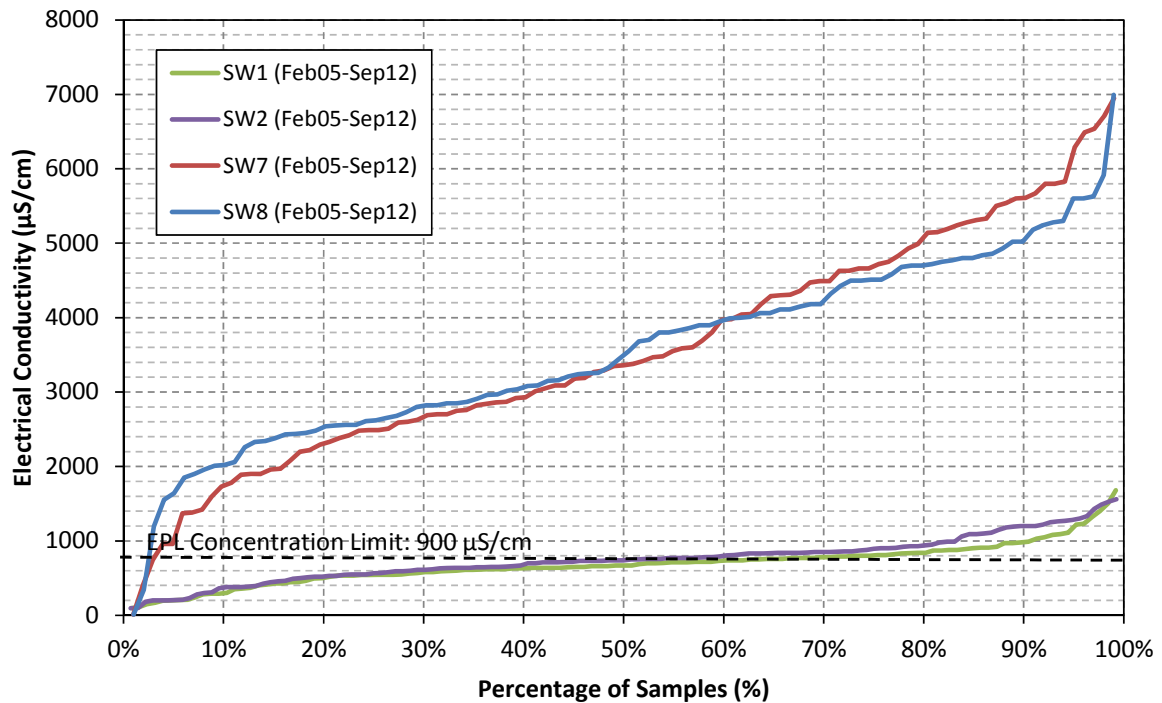


Figure 3.6 Moolarben Creek, Lagoon Creek (upstream) and Goulburn River (downstream) electrical conductivity percentile plot

### 3.3 Water take

**Submissions** – C5.10, C9.4, C15.6, C16.4, C17.3, C18.6, C19.16, C19.8, C19.18, C21.2, C26.5, C27.4, C29.5, C31.3, C32.8, C37.7, C39.4, C39.16, C39.17, C39.27, C41.3, C44.1

*Submissions on water take are concerned with reduction in Goulburn River baseflows due to the interception of overland flow by the proposed extension areas. One submission contends that the purchase of water licenses to offset groundwater loss from Moolarben Creek cannot compensate baseflow loss when a 'cease to pump' restriction would have applied to the license ie critically low stream flows during extended dry periods.*

Reduction in baseflow to surface water courses is more closely related to the influence of groundwater levels than surface runoff. The impact of the proposed modification on baseflow reduction is addressed in Chapter 4 below. As indicated in the surface water study (EA Appendix I, Section 4.4), the proposed modification will result in the capture of runoff from an additional 140 ha of Moolarben Creek catchment. This corresponds to an average annual runoff loss of 35 ML/year, which represents a 1.1% reduction in Moolarben Creek catchment area. Any impacts on the flow characteristics of Moolarben Creek from this marginal reduction in catchment runoff are unlikely to be detectable from the reduced catchment area.

MCO is currently in the process of purchasing sufficient entitlements to account for the maximum predicted water take as a result of the MCP (including baseflow reduction) from the Upper Goulburn River Water Source. This has been noted by NOW, which considers that the quantum of proposed entitlements will cover any minor unpredicted take from the Upper Goulburn River Water Source through reduced baseflow to Moolarben Creek as a result of the proposed modification.

There are currently no flow classes defined for the Upper Goulburn River Water Source within the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*. However, 'Very Low Flow Class' and 'Class A' flow levels may be established by Year 10 (2019) of the plan. If cease to pump rules are established, then MCO will abide by the rules of the water sharing plan, and return water where required.

Water licensing is addressed further in Section 4.2.

### 3.4 Site surface water management

**Submissions** – S1.4, , S3.4, S4.34, S5.4, , , C5.9, C15.6, C16.1, C16.4, , C17.3, C18.6, C19.8, C19.13, C19.14, C19.18, C19.19, C21.2, C24.1, C24.4, C24.5, C26.5, C27.4, C29.5, C31.3, C32.8, C37.7, C38.4, C38.5, C39.4, C39.12, C39.13, C39.14, C39.15, C39.18, C39.19, C39.23, C39.24, C39.25, C39.26, C39.27, C41.3, C41.5, C44.1

*A number of submissions contend that the scale of disturbance combined with a poorly designed mine water management plan leads to the risk of potentially significant downstream impacts on river water quality at The Drip and into Goulburn River National Park.*

The proposed modification represents a relatively small change to the extent of disturbance. The site water management system will be operated in accordance with MCO's approved WMP and EPL. MCO will review and revise its WMP as necessary to accommodate the proposed modification to ensure the effective management of surface and groundwater. The proposed mine site water management strategy and infrastructure will ensure that the proposed modification has a negligible impact on the quality of surface runoff and receiving waters.

*Several submissions contend that The Goulburn River at The Drip Picnic Area and downstream is a natural 'high value' stream under direct pressure from upstream mining activities. Contamination of the sandy stream bed by fine clay sediments, a doubling of background salinity levels, increasing algae blooms and declining aquatic biodiversity are clear warning signs that the system is under pressure.*

Based on the results of site water balance modelling, the proposed modification will reduce the predicted total volume of allowable sediment dam overflows (which only occur when rainfall exceeds the approved design standard of the erosion and sediment control system) by about 15% (refer Table 6.16 of the surface water study) compared to what would be expected to occur without the proposed modification. It is noted that Table 6.16 contains a typographic error – the sediment dam overflow volume prior to the modification should be 267 ML.

Salinity levels, algal blooms and aquatic biodiversity at The Drip Picnic Area are affected by land use and water management across a large upstream catchment area which also includes significant areas of agricultural development, the Ulan settlement and the Ulan Coal Mine. The proposed modification will not adversely impact The Drip Picnic Area. As shown in Table 6.16 of the surface water study, total discharges from the site (licensed discharges plus allowable sediment dam overflows during rainfall events that exceed the approved design standard) with the modification are predicted to be lower than that which is approved to occur without the modification.

*One submission contends that open pits and earthworks next to floodways cannot be made safe even by claims they are above historical flood levels. Flooding will worsen with climate change and associated increase in extreme weather events.*

The adopted design standard of flood protection works for open cut pits will be in accordance with relevant government requirements.

*One submission raises the need for a substantial increase in the EPL discharge limit from 800 KL/year to 10 ML/year is symbolic of the inadequate predictions that have plagued the Stage 1 water management.*

An increase in the licensed discharge limit does not form part the proposed modification. This increase was fully assessed and approved by the EPA, and forms part of the conditions of the EPL 12932.

*Submissions contend that significant water demand of between 1,500 and 2,380 ML/year is required for dust suppression and coal preparation.*

The proposed modification results in an additional water requirement for the MCP Stage 1 of 200 ML/year. The anticipated maximum total site demand, including the proposed modification, is 2,381 ML/year. A portion of this demand will be met by recycling of groundwater inflows and runoff captured on site, resulting in a maximum water demand of 1,940 ML/year from external sources (depending on climatic conditions). Sufficient water is available under the existing water sharing agreement with Ulan Coal Mine and through licensed groundwater extraction to meet this demand.

*The Hunter Environment Lobby asserts that 'the whole mine operation will have a daily water demand of 6.9ML/day and an annual requirement of 2,520 ML/year'.*

It is noted that the figure of 2,520 ML/year is incorrectly stated in Section 14.5 of the EA. As discussed above and as specified in Section 4.2 of the surface water study, the anticipated maximum total site demand, including the proposed modification, is 2,381 ML/year, with a maximum water demand of 1,940 ML/year from external sources.

*One submission contends that MCO monitoring methodology of sediment dam runoff and stream sites when a rain event exceeds 30 mm over 24 hours is essentially flawed. A pulse of storm water after such a rain event would travel more than 17 km downstream in 24 hours (using a conservative speed of 0.2 m/s - average centre channel flow rate of the Goulburn River is 0.35 m/s). Sampling needs to occur within 12 hours of the rain event, preferably using continuous hourly loggers. This would allow all rainfall events that produce runoff and stream flow to be monitored, including intense summer storms where even 15 mm rain can produce significant runoff (particularly if it falls within 2 hours or on saturated soils).*

The surface water study was carried out by suitably experienced and qualified technical specialists in accordance with industry and government guidelines and is based on extensive baseline monitoring data.

The 24 hour period is the time over which the rainfall is measured, not the time between rainfall and collection of samples. Monitoring would be undertaken as soon as practical after a rainfall event. The proposed monitoring protocol is consistent with industry practice and has been approved by relevant government authorities.

*Several respondents were not confident of MCO's ability to effectively manage surface water and prevent offsite pollution under its current management plan/system. Several submissions contend that the WMP is not adequately able to cope with medium to high rainfall events, climatic extremes and risk from human error. Other specific issues raised in relation to the WMP are as follows.*

- *The timing for the implementation of the proposed WMP will result in the suspension of water quality protection.*
- *The WMP is under designed for the scale of the open cut operations, total surface disturbance and rainfall regime.*
- *The WMP is a high risk water management strategy dependent on a series of sediment and mine storage dams maintained by a complicated pumping regime with little room for human error or climatic extremes.*
- *The WMP depends on the suspension of pollution control limits should rainfall exceed 44 mm over five consecutive days. This would permit uncontrolled overflows from MCO sediment dams and mine water dams. The suspension of water pollution control limits an admission by MCO that it is unable to manage the volume of onsite water runoff for a moderate high rain event.*

The WMP aims to maximise the on-site containment and reuse of sediment-affected runoff, coal-affected runoff and groundwater inflow. The mine water management system will be operated in accordance with the approved WMP and EPL conditions. The EPL conditions (including Condition L2.6 relating to rainfall in excess of 44 mm over a 5 day consecutive period) reflect the current design standard recognised as industry best practice for erosion and sediment control systems.

Further, the following recommendations are made for MCO's water management system in one submission:

- *the scale of surface disturbance is reduced and clean water diversion drains installed where-ever feasible to ensure realistic and effective surface water management;*
- *installation of continuous loggers (hourly) for monitoring water quality at discharge sites, dam overflow points and upstream and downstream receiving waters to ensure water quality parameters are recorded within 10 hours of a rain event: >25mm over 24 hours/>15mm over two hours;*
- *environmental regulations and conditions for protecting downstream water quality and in stream ecology are outcome based requiring all offsite discharges to reflect the 'real-time' quality of receiving waters (eg turbidity, salinity and pH);*
- *rehabilitated land is returned to clean water catchment only when over 70% perennial ground cover has been achieved (minimum three years); and*
- *effective and prompt deterrent penalties are included in the regulations.*

The site water management system, including the water monitoring network, has been designed to minimise clean water capture and the impacts of the project on receiving waters. The system will be operated in accordance with the site WMP and EPL. The WMP was prepared in consultation with the EPA, DTI and NOW. MCO will review and revise its WMP as necessary to accommodate the proposed modification in accordance with government guidelines and best practice. With reference to each of the above points:

- clean water diversion drains will be installed where feasible;
- the timing and frequency of monitoring of water quality and quantity will be undertaken in accordance with the approved WMP and EPL;
- environmental regulations and conditions are specified in the site EPL;
- rehabilitated areas will be returned to clean water catchment in accordance with MCO's Landscape Management Plan (LMP), updated to incorporate the proposed modification and approved by DP&I in consultation with the relevant government agencies; and
- penalties for failure to comply with EPL requirements will be determined through relevant regulatory processes.

*The Xstrata Coal submission notes that any change to MCO's water management system must not impact upon Ulan Coal Mine's ability to carry out licensed discharge in accordance with the requirements of EPL 394.*

The site water management system will be operated in accordance with MCO's WMP and EPL. MCO will review and revise its WMP as necessary to accommodate the proposed modification. The proposed modification will not impact on Ulan Coal Mine's ability to carry out licensed discharge in accordance with the requirements of EPL 394.



### 3.5 Surface water management infrastructure upgrades

**Submissions** – S1.6, C2.1, C3.1, C7.1, C10.7, C14.6, C15.10, C16.8, C19.2, C19.20, C25.6, C28.9, C29.6, C33.4, C37.9, C39.3, C43.4, G8.8

*A number of submissions refer to previous breaches of EPL discharge conditions and suggest that MCO and the current water management system has failed to manage pollution incidents.*

*The EPA notes in its submission that it has been discussing the upgrade of the existing MCP Stage 1 water management system with MCO, and that MCO has been required to complete a number of Pollution Reduction Programs (PRPs) to review the current system and determine the upgrades which are required to improve the system and reduce the potential for sediment laden discharges. The EPA refers to proposed upgrades recommended in a report prepared by Akhill Engineers (AE) in October 2012 that have now been agreed to by the EPA and MCO. The EPA considers the upgrades are necessary and has now imposed a specific PRP requiring MCO to complete the proposed upgrades by 18 December 2015. The EPA recommends that the upgrades form part of MOD 9.*

MCO has developed a package of works to enable the upgrade of the surface water management infrastructure to be implemented in line with the requirements of the PRP and EPL conditions. The proposed works which have been agreed to by the EPA include:

- Upgrading the holding capacity of Sediment Dam 07 from 0.22 ML to 0.5 ML.
- Constructing a new 9 ML sediment dam (Sediment Dam 10B) upstream of existing Sediment Dam 10 and increasing the capacity of existing Sediment Dam 10 to 2 ML, to increase the combined holding capacity to 11 ML.
- Removing Sediment Dam 11 and creating a natural swale to allow conveyance of surface runoff from the upstream clean water catchment.
- Infilling Sediment Dam 11 and creating a drainage swale to allow conveyance of clean water runoff.
- Constructing a new 1.7 ML sediment dam adjacent to existing Sediment Dam 12 to increase the combined holding capacity from 0.8 ML to 2.5 ML.
- Upgrading the holding capacity of Sediment Dam 14 from an estimated 0.25 ML to 6.5 ML.
- Upgrading the holding capacity of Cockies Dam from 2ML to 33 ML. (Note excavated material will be emplaced adjacent to the dam).
- Cockies Dam will be set up as the future licensed discharge point.
- Constructing two clean water diversion bunds (Diversion Bund 1 and Diversion Bund 2) to enable up catchment surface runoff to bypass the rail loop on its northern and southern sides. (Note the bunds will be formed with material excavated from dam upgrades and from the existing unsuitable stockpiles, capped with clay and top soil, then vegetated).
- Reshaping, capping, topsoiling and vegetating residual stockpiles. (Note Sediment Dams 03, 04, 05 and 06 will remain temporarily active until the rehabilitated residual unsuitable stockpile is vegetated, at which time these sediment dams will be decommissioned).

A comparison of the existing and proposed CHPP/rail loop area surface water management infrastructure is provided in Table 3.3 and shown in Figure 2 (Appendix D).

**Table 3.3 Comparison of approved and proposed CHPP/rail loop area surface water management infrastructure**

<b>Approved Stage 1</b>	<b>Proposed Stage 1</b>
Clean Water Dam	The dam will be used in the future as another process dam for storage of dirty water
Process Water Dam	No change
Cockies Dam	The capacity of the dam will be increased from 2 ML to 33 ML
Sediment Dam 01	No change
Sediment Dam 02	No change
Sediment Dam 03	Decommissioned once reshaped residual stockpile is vegetated
Sediment Dam 04	Decommissioned once reshaped residual stockpile is vegetated
Sediment Dam 05	Decommissioned once reshaped residual stockpile is vegetated
Sediment Dam 06	Decommissioned once reshaped residual stockpile is vegetated
Sediment Dam 07	The capacity of the dam will be increased from 0.22 ML to 0.5 ML
Sediment Dam 08	No change
Sediment Dam 09	No change
Sediment Dam 10	A new 9 ML sediment dam (Sediment Dam 10B) upstream of existing dam will be constructed and the capacity of the existing dam increased to 2 ML to give a combined capacity of 11 ML
Sediment Dam 11	The dam will be infilled and a natural swale constructed to allow conveyance of surface runoff from the upstream clean water catchment
Sediment Dam 12	A new sediment dam adjacent to the existing dam will be constructed to increase the combined holding capacity from 0.8 ML to 2.5 ML
Sediment Dam 14	The capacity of the dam will be increased from an estimated 0.25 ML to 6.5 ML

To meet the EPA requirements, it is MCO's intention to commence the proposed upgrade works in early 2014. Construction is expected to be completed within approximately six months.

The potential for additional noise and dust emissions, traffic generation and additional ground disturbance resulting from the implementation of these activities has been assessed. Technical assessments are provided in Appendix F and conclude:

- There will be no increased noise or dust levels above approved MP 05\_0117 limits as a result of the activities.
- There will be a minor short term increase in heavy and light vehicle movements during construction. Short term traffic increases on affected roads will be minimal on an average daily traffic basis and will not affect the existing traffic capacity, traffic safety or intersection performance.

- Activities will disturb approximately 12.50 ha of cleared land and 10.23 ha of native vegetation, including up to 3.39 ha of vegetation that meets the description of Box Gum Woodland Threatened Ecological Community (under both the TSC and EPBC Acts). This vegetation provides potential habitat for a number of threatened species. Potential impacts will be managed in accordance with MCO's procedures and the BOS/BOP which has been updated accordingly. Assessments of significance conclude that the activities will not significantly impact threatened species or communities.
- Two isolated artefact sites of low significance were identified during the archaeological survey. These will be managed in accordance with the approved Aboriginal Cultural Heritage Management Plan. All other known sites identified for insitu conservation will be avoided during construction activities.



## 4 Groundwater

### 4.1 Assessment approach

**Submissions** - S1.1, S1.4, S1.5, S3.4, S3.6, S3.10, S4.11, C19.15, C20.1, G4.8

The above submissions raise matters in relation to the groundwater study (AGE 2013) (EA Appendix J) of the proposed modification.

*Submissions contend that there was no assessment of the cumulative loss of water to the Upper Goulburn River catchment from the combined interception and use of water by Wilpinjong and Ulan Coal Mines and all proposed stages of the MCP.*

Aquaterra (2008) and RPS Aquaterra (2011 and 2012) modelled the cumulative groundwater impacts of the Wilpinjong and Ulan Coal Mines, combined with Stages 1 and 2 of the MCP, as part of Stage 2 investigations, using the MODFLOW-SURFACT groundwater model. RPS Aquaterra (in its Stage 2 investigations) performed two model simulations, one inclusive of all three approved mines and known (at the time) proposed projects, then a second model simulation of only the Wilpinjong and Ulan Coal Mines to determine the impact of the MCP only. Hence, the project specific impacts associated with the MCP and cumulative impact (including combined groundwater interception) of the three mines has been determined. The results are available in the Aquaterra (2008) and RPS Aquaterra (2011 and 2012) reports. The numerical model used in these prior investigations was gradually refined over time as new data was collected from MCO's extensive groundwater monitoring network, and were subject to both peer and independent reviews. The resultant model shows good agreement with field data.

The proposed modification is seeking to extend open cut mining in an area between the existing Stage 1 open cut and proposed Stage 2 underground and open cut mines. Monitoring shows the geological strata in this area is generally poorly saturated. Hence the results from the previous modelling are applicable to the groundwater study for the proposed modification. The groundwater study drew upon previous groundwater investigations and up-to-date monitoring data to make predictions of the effects of the proposed open cut extension areas on the groundwater regime.

The groundwater study for the proposed modification (EA Appendix J) found that groundwater interception by the MCP, including the proposed modified Stage 1 operations, to be within the range of that previously predicted for the approved Stage 1 and proposed 2 operations. That is, there will be no additional groundwater inflow above rates predicted for the Stage 1 and Stage 2 operations.

MCO is required to hold the appropriate licence entitlements to account for the predicted impacts of the mine.

*Several submissions more generally contend that the cumulative impacts on flows and water quality in the Goulburn River have not been adequately assessed. They state that Ulan Mine intercepted 4,355 ML during 2011/12 and the predicted additional interception of 1,304 ML/year from the proposed modification will result in mining intercepting almost 6 gigalitres (GL) of surface and groundwater associated with the Goulburn River.*

The groundwater study for the proposed modification assessed the impact on the Goulburn River water source of no more than currently predicted for approved Stage 1 and proposed Stage 2 operations. The volume of baseflow to be intercepted by both Stages 1 and 2 of the MCP has been assessed by RPS Aquaterra (2012). MCO is currently acquiring a water licence to account for the maximum worst case predicted water take associated with the development of all aspects of the approved and proposed MCP.

There is no mention in the groundwater study of the 1,304 ML/yr volume as noted in the submission. As such, it is assumed that this quoted figure is incorrect.

In NSW, the licensing and sharing of water (including for domestic, cultural, agricultural, industrial, mining and town water supply) is governed by the *Water Act 1912*, the *Water Management Act 2000* and their associated regulations. The licensing system aims for sustainable allocation of water resources by (among other things) allowing licence entitlements to be traded between water users. MCO is required to hold appropriate and adequate water licence entitlements to account for its predicted water take from all affected water sources. Both Ulan and Wilpinjong Coal Mines have a similar requirement (as do all other water users), hence the cumulative effects of all water users is accounted for through the water licensing regime.

NOW, in its submission on the proposed modification, acknowledges that “the water level and pit seepage data collected to date is within the ranges predicted by previous investigators using numerical models, which verifies the soundness of the previous studies. As the numerical groundwater model has been gradually refined over time as new data was collected, peer reviewed, and showing good agreement with field data, it was deemed appropriate for use in assessing the impact of the proposed modification, and no further modelling was undertaken. Mine inflows for the majority of the proposed modification are stated to be within the range predicted for the approved Stage 1 and the proposed Stage 2 operations. A large proportion of the proposed extension area is within landscapes that are ‘dry’ or contain limited saturated thickness of groundwater above the base of the Ulan Seam”.

Surface water quality and take are addressed in Sections 3.2 and 3.3, respectively.

## 4.2 Licensing

### **Submissions – G4.1, G4.3, G4.6, G4.10**

*NOW requires MCO to estimate the volumes of water taken from both the surface water, including rainfall runoff, and groundwater from each water source to determine licensing requirements.*

As noted in Section 4.1, the take of water from a water source (inclusive of groundwater or surface water) must be accounted for and licensed in accordance with the requirements of the *Water Act 1912* and the *Water Management Act 2000*. In the vicinity of the proposed modification, the licensing of take from alluvial aquifers and surface water sources is managed in accordance with the rules of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*.

Groundwater intercepted during mining activities (other than alluvial aquifers covered by the Water Sharing Plan) are regulated under the *Water Act 1912*. In the context of the proposed modification this relates to groundwater within the Permian coal measures being mined and all associated consolidated strata.

The proposed modification will take no additional groundwater (alluvial and non-alluvial) beyond that previously estimated and approved for Stage 1 and previously estimated for the proposed Stage 2 of the MCP. Further, it will have no additional direct or indirect impact (water take) on surrounding surface water sources to that predicted to occur for the combined Stage 1 and Stage 2 Projects.

MCO currently holds an appropriate mine dewatering licence to account for groundwater inflows from the Permian coal measures to Open Cut 1 and is currently reviewing its requirements for a dewatering licence for Open Cut 2. No increase in pit inflows due to the proposed modification is expected, rather, there will be a continuation of inflows at previously modelled and approved inflow rates.

As indicated in 4.1 above MCO is currently acquiring the appropriate water entitlements to account for indirect water take from alluvial and surface water sources predicted to occur as a result of developing the MCP. The volume of these entitlements will be sufficient to account for the predicted worst case impacts on the Upper Goulburn River Water Source as a result of the combined Stage 1 and Stage 2 Projects (inclusive of the proposed modification).

The capture of runoff from the Moolarben Creek catchment is addressed in Section 3.3.

### 4.3 The Drip

**Submissions** – S2.4, S3.17, S4.7, C1.1, C3.5, C5.11, C6.3, C10.6, C11.1, C14.5, C15.7, C16.5, C17.4, C18.7, C19.9, C21.5, C27.5, C28.10, C31.4, C32.9, C33.3, C37.8, C39.22, C41.4, C44.2, G4.7

*A number of submissions referenced The Drip, in relation to:*

- *potential impacts from the proposed modification;*
- *its uniqueness, importance and significance;*
- *the need for government protection; and*
- *its potential as a tourist destination.*

The Drip is located approximately 6 km to the north of the proposed extension areas. The Drip will not be adversely impacted by the proposed modification.

The Drip's uniqueness, importance and significance are acknowledged by MCO, including its potential as a tourist destination. MCO is working with government authorities to determine the most appropriate mechanism for the long-term conservation of this unique feature.

The proposed mine extension areas are located at least 6 km to the south of The Drip and there will be nil impact to The Drip from the proposed mine extension. This is acknowledged by NOW, in its submission, which notes that 'The proposed modification will have a nil impact on The Drip, being the only significant seep/spring GDE within the locality. Stage 2 modelling predicted nil impact on The Drip due to its relative distance from and limited hydraulic connection. The proposed modification will have nil change in the groundwater drawdown in the vicinity of The Drip. Therefore, there will be no impact on vegetation supported by The Drip'.

## 4.4 Other matters

**Submissions** – S1.7, S4.12, C1.3, C3.4, C9.2, C10.5, C12.2, C25.11, C25.4, C34.1, C35.3, C36.4, C39.20, G4.2, G4.4

Several submissions raise general matters in relation to groundwater.

*A number of submissions suggest that MCO needs to develop strategies on how to manage the surface and groundwater in a modified land form, and should also update the WMP to accommodate the proposed modification.*

Groundwater at the MCP is managed under MCO's WMP (and relevant sub-plans), developed in consultation with NOW, OEH and DTI. The WMP includes strategies to effectively manage surface and groundwater, and as per the commitments made by MCO in the EA, the WMP will be reviewed and updated, as required, to accommodate the proposed modification.

*One submission raises the migration of salinity within spoils, the speed it travels to the void, and aquifers becoming saline.*

Salinity within spoil at the MCP has been investigated through column leach tests of composite samples from three drill holes that represent spoil material (Environmental Geochemistry International 2008). Results indicate that water passing through spoil will have a less saline water quality signature than original groundwater within the Permian Coal Measures prior to mining.

Groundwater will travel relatively quickly through spoil due to increased permeability of the unconsolidated material. Permeability within spoil will be several orders of magnitude higher than those of the Permian Coal Measures. Groundwater that migrates through spoil will migrate to final voids and is not expected to migrate to surrounding surficial alluvial aquifers or creeks.

Long term 100 year recovery modelling post mining was carried out by RPS Aquaterra (2011 and 2012). This work indicated that, due to the large proportion of the pit areas to be backfilled, groundwater levels will recover to their pre-mining levels at the MCP and, in some cases, may recover beyond pre-mining levels. Kinetic leach testing assessed that the quality of this water will be relatively low in salinity compared to Permian aquifer water quality and, therefore, does not pose a long term risk to water quality. It is noted that there is no change to the number of approved voids under the proposed modification.

*One submission raises concern for continuity of the spring water source that provides 90% of the water requirements for the agricultural enterprise and domestic use on the respondent's property, which is located in the Moolarben Valley to the south of the approved Stage 1.*

The groundwater studies for Stage 1 did not predict any impacts to the springs on the respondent's property. The proposed modification is not predicted to have additional impacts to those assessed and approved for Stage 1. Therefore, the proposed modification is not predicted to adversely impact the spring water source on this property.

*One submission raises concern with spurious legislation that enables mines to utilise groundwater without a permit that will continue to have unacceptable impacts that deplete and contaminate subterranean and above ground watercourses. The respondent states that the fact water licenses are not required because diversion and use of water for mining is exempt under the Water Management Act 2000 is not the way water resources should be managed.*



MCO is required to abide by existing legislation just like any other water user and hold appropriate licences to account for its take of water.

*Submission contend that the proposed modification will place additional pressure on the Goulburn River and the fragile aquifer system. No further impacts on base flows and surface flows should be considered until an independent regional water study is conducted on the current cumulative impacts of the three mining operations in the Upper Goulburn River water source.*

The potential effects of the proposed modification on the Goulburn River water source and regional aquifer system have been assessed as no more than previously simulated for Stage 1 and Stage 2 operations. Previous simulations have taken into account cumulative effects of the three mining operations (MCP, Wilpinjong and Ulan Coal Mines) as well as the effect of the MCP on its own. As mentioned, MCO is required to abide by existing legislation and hold appropriate licences for its take of water.

*One submission contends that there is a substantial risk that the extension and location of Open Cut 2 (depth 20 m) within 100 m of Moolarben Creek and 170 m from 'known' alluviums may breach the NSW AIP. The AIP requires there be no more than a 2 m drawdown in groundwater levels (whether extracted directly for consumptive purposes or taken incidentally) or that the long term average salinity does not increase by more than 1% per activity.*

The groundwater regime in the immediate vicinity of the proposed modification comprises the following two aquifer systems:

- porous and/or fractured consolidated sedimentary rock aquifers of the Permian Coal Measures and overlying Triassic sequence; and
- alluvial aquifers associated with Moolarben Creek and Lagoon Creek.

Based on the extent, storage capacity, quality and yield of groundwater in these two aquifer systems, both aquifers in the vicinity of the proposed modification are not highly productive aquifers and are classified as 'less productive aquifers' according to the definitions in the AIP.

The AIP requires, among other things, that aquifer interference activities do not induce a decline of more than 2 m in the water table or water pressure at any water supply work (ie a landowners bore or a well) unless 'make good' provisions apply. No private bores are within the zone of drawdown, indicating that the MCP, inclusive of the proposed modification, complies with this AIP requirement.

To protect surface water, the AIP requires, among other things, that there is no lowering of the beneficial use category of the groundwater beyond 40 m from the activity and 'no increase of more than 1% per activity in the long term average salinity in a highly connected surface water source at the nearest point to the activity'. There is no evidence from extensive in-field studies of a highly connected system (as documented in Dundon 2006). Rather the thin low permeability alluvium of Moolarben Creek forms a less productive aquifer (as indicated above), receiving recharge from rainfall, run-off and limited seepage from the underlying more saline Permian rock aquifer system.

The AIP indicates that, a water licence is required under the *Water Management Act 2000*, unless an exemption applies; and, a water licence is required whether water is taken for consumptive use or whether it is taken incidentally.

As previously indicated, MCO is currently securing sufficient entitlements to account for its predicted and approved indirect water take impacts on the Upper Goulburn River Water Source.

NOW, in its submission, notes that the proposed modification falls within Level 1 of the minimal impact considerations of the AIP, which is defined as acceptable by the AIP.

## 5 Ecology

### 5.1 Introduction

This section presents responses to submissions made in relation to ecological matters. Of significance, the Biodiversity Offset Strategy and proposed Offset Package (BOS/BOP) presented in Appendix E of the EA has been revised, based on additional feedback provided by OEH, post-public exhibition of the document. The BOS/BOP has also been revised to address the DP&I's request (refer Section 2.5) for upgrades to the Stage 1 water management infrastructure (refer Section 3.5) to be incorporated as part of the proposed modification. A further ecological study (Appendix D), prepared as an addendum to the ecological study for the EA (EMM 2013a), provides consideration of the potential for additional ecological impacts for the proposed upgrades, identifying an additional 10.23 ha of native vegetation that would be disturbed.

Overall, the quantum of proposed offsets has increased substantially, from 629 ha to 924 ha, and now comprises 613 ha of woodland, 100 ha of sparse/regenerating woodland and 211 ha of derived native grassland (DNG). The revised BOS/BOP is provided as Appendix E and is discussed further in Section 5.9. Those matters raised by OEH, prefixed with G7 in relevant sections below, were prepared in the context of the now superseded BOS.

### 5.2 Assessment approach

**Submissions** – S1.13, S1.14, S4.15, S4.18, G7.1, G7.2, G7.3, G7.7, G7.14, G7.15

The above submissions raise matters relating to inadequate survey effort, resulting in poor identification of species.

*Submissions contend that inadequate fauna survey effort resulted in poor identification of species.*

As stated in Section 10.3.1 of the EA, numerous ecological studies have been completed within the MCP area and surrounds. Relevant literature and databases were reviewed to compile a list of threatened species, populations and communities likely to occur in the proposed extension areas. Information reviewed is provided in Section 3.3 of the ecological study (EMM 2013a) (EA Appendix E).

It is noted that the entirety of the proposed extension areas were previously surveyed by Moolarben Biota (2006) as part of the Stage 1 EA. The ecological studies carried out for the proposed modification compliment and build on these prior studies. This has resulted in substantial survey effort undertaken for threatened flora and fauna species known or likely to occur within the proposed extension areas and surrounds.

An assessment of EMM's survey effort for fauna and flora, comparing the total survey effort against the *Threatened Biodiversity Survey and Assessment Guidelines for Developments and Activities* (DEC 2004) is presented in this section. It is considered that the fauna survey has been extensive, enabling adequate species identification and a robust ecological assessment of impacts. This is further substantiated below.

*OEH recommends that comparison information be provided in table format to compare flora and fauna survey effort at the extension areas with the survey effort requirements as prescribed in DEC (2004); and justification be provided for reduced survey effort in the cases where it does not meet the prescribed effort.*

Table 5.1 provides a summary of EMM survey effort for flora and fauna, comparing the total survey effort against the DEC (2004) guidelines.

**Table 5.1 Summary of survey effort**

Survey method	DEC (2004) guidelines required survey effort	EMM survey effort	Comparison
<b>Flora</b>			
Plot and transect surveys	2 plots and 2 transects per 2-50 ha of stratification area = 12 plots and 12 transects in the proposed modification	8 plots and 8 transects	4 plots and 4 transects less than required <sup>1</sup> (note that 22 plots were completed in the proposed extension areas for the Stage 1 EA)
Rapid vegetation assessments <sup>1</sup>	12 points	42 points	Exceeds requirements
Targeted threatened flora searches	12 random meanders	42 random meanders	Exceeds requirements
<b>Fauna</b>			
Habitat assessments and searches for signs of use	No survey effort specified	Over 80 person hours	n/a
Reptile active search	30 minute search per stratification unit on two separate days	24 person hours (with at least two searches in each stratification unit on separate days) over 6 days	Exceeds requirements
Reptile nocturnal search	30 minute search per stratification unit on two separate nights	48 person hours (over 6 nights)	Exceeds requirements
Timed diurnal bird search	Per stratification unit	8 search areas in 6 stratification units (20-60 minutes per search)	n/a
Anabat detection	2 detectors recording for the entire night for two nights per 100 ha	4 separate detectors in separate locations set for 8 nights	Exceeds requirements
Harp trapping	4 trap nights over two consecutive nights per 100 ha	4 separate traps in 2 locations set for 8 nights	Exceeds requirements
Arboreal mammal trapping B Elliott traps	24 trap nights over 3-4 consecutive nights	160 trap nights (24 traps deployed over 8 nights) in 2 locations	Exceeds requirements
Koala spot assessment technique	30 minutes searching each relevant habitat	5 person hours (over 3 habitat types)	Exceeds requirements
Nocturnal birds and mammals call broadcasting and spotlighting	One kilometre on foot over two separate nights per 200 ha	One kilometre on foot over six separate nights in 7 locations	Exceeds requirements
Infrared camera surveys	No survey effort specified	64 trap nights	n/a

Notes 1. The DEC (2004) guidelines state that rapid assessments (specifically random meanders) can be used in place of transects (Section 5.2.1i).

As shown in Table 5.1, EMM's survey effort exceeded DEC (2004) guidelines for all but one of the survey methods. The EMM survey completed four less quadrats and transects than prescribed by the DEC (2004) guidelines for the study area. However, 42 random meanders and 42 rapid vegetation assessments were completed across the study area to supplement vegetation data collected in quadrats and transects. Such data was important in defining vegetation community boundaries and increasing species lists. The DEC (2004) guidelines also state that rapid assessments (specifically random meanders) can be used in place of transects (Section 5.2.1i).

Detailed vegetation data for the proposed extension areas was also collected from 22 quadrats by Moolarben Biota in a survey for the Stage 1 EA. These results were used for the current assessment and increase the total number of plots to 30 for the proposed extension areas, easily exceeding the DEC (2004) guideline requirement of 12 plots. Additional survey methods beyond the guidelines were also undertaken, including infrared camera surveys, habitat searches and searches for signs of use by key species.

*OEH recommends that flora surveys should be undertaken in the appropriate flowering periods this year for those species unlikely to have been detected by the previous surveys, or else the assessment should assume the presence of these species. It specifically recommends surveys for *Diuris tricolor* in the appropriate flowering period this year and prior to any approval being granted, or else the assessment should assume the presence of this species and mitigate accordingly.*

Flora surveys for the proposed modification were undertaken in summer 2012. This is outside the flowering period of the Pine Donkey Orchid (*Diuris tricolor*) and the Silky Swainson-pea (*Swainsona sericea*), which are cryptic species that are not readily detectable outside the flowering period. It is considered that these are the only species for which suitable habitat occurs in the proposed extension areas. The Moolarben Biota survey for the Stage 1 EA completed targeted surveys for these species during their flowering period. No individuals or populations were identified in the proposed extension areas.

Notwithstanding, targeted flora surveys within the proposed extension areas are planned for these species in spring 2013, concurrent with the project assessment and determination. If the threatened plants are detected in the proposed extension areas the impact will be assessed, appropriate mitigation measures will be devised (for example, translocation) and the offset strategy will be amended to compensate for any direct or indirect impacts on this species if required, in consultation with OEH.

Further targeted surveys for these species will also be conducted in spring 2013 in the proposed offset areas. It is noted that the Pine Donkey Orchid has already been detected at one of the biodiversity offset sites (property 24/25) within the remnant Rough-barked Apple – Silvertop Stringybark – Red Stringybark vegetation community where five individuals were confirmed from a habitat area of 7.5 ha (Appendix E). The Pine Donkey Orchid is likely to occur in other offset areas in suitable habitat. Similarly, the Silky Swainson-pea may occur in suitable habitat in offset areas, despite the lack of records in the locality.

*OEH recommends that, given the strong likelihood that pure *E. cannonii* occur on the site, this species should be assessed accordingly unless its absence has been confirmed.*

During the ecology study for the proposed modification, nineteen trees that were suspected to be Cannon's Stringybark (*Eucalyptus cannonii*), were found in the proposed Open Cut 1 extension area. Poor quality samples (material found on the ground surrounding the trees) were taken and were reviewed by identification botanists at the Royal Botanic Gardens in Sydney. The identification botanists concluded that the samples collected were hybrids of Cannon's Stringybark and Red Stringybark (*Eucalyptus macrorhyncha*). The hybrid is not recognised in the approved Commonwealth conservation advice (DSEWPac 2008) or the NSW Environment Impact Assessment Guidelines (NPWS 2000).

Subsequently, better quality samples (off the tree) were collected from 4 of the 19 suspected Cannon's Stringybark/Red Stringybark hybrids and analysed by botanists. Although samples could not be collected from the remaining 15 individuals (due to infield sampling safety concerns), a qualified botanist experienced in the identification of Cannon's Stringybark determined that the remaining unsampled trees were the same as the ones that samples were collected from. The samples were sent to the identification botanist at the Royal Botanic Gardens who confirmed that the samples were from the common species, Red Stringybark. Formal advice from the Royal Botanic Gardens is provided in Appendix E.

The results of the current study and verification by the Royal Botanic Gardens are consistent with the outcome of the detailed field studies undertaken by Moolarben Biota (2006), which did not identify any pure Cannon's Stringybark individuals within the proposed extension areas. As the 19 suspected hybrids have been identified as a pure stand of Red Stringybark, there is no potential for a Cannon's Stringybark to occur in this area and, therefore, the proposed modification will have no impact to Cannon's Stringybark.

*OEH recommends that the EA be revised to include further assessment of the extent of cave-roosting microbat habitat on the site and the predicted level of impact on these species.*

Rocky areas in the proposed extension areas are comprised of small shallow sandstone outcrops with cracks and fissures, and some overhangs. Approximately 3 km of outcrop is planned for removal in the proposed extension areas. Targeted searches were undertaken in these areas for signs of bat presence and assessed for suitability as habitat for threatened bat species.

Only one area showed evidence of occupation by microbats (a rocky outcrop approximately 5 m in length), containing microbat scat (see Photograph 5.1). Given the shallow nature of the outcropping, this was not considered suitable for a Large-eared Pied Bat roosting site, and was determined to most likely be an Eastern Cave Bat roosting site. Roosting habitat in the proposed extension areas is considered to be marginal for the Large-eared Pied Bat.

The potential impacts of the proposed modification on cave-roosting bats and the measures to compensate for these impacts are further discussed in Sections 5.4 and 5.9, respectively.



**Photograph 5.1** Overhang in the proposed extension areas, considered likely to provide roosting habitat for the Eastern Cave Bat and ledge where bat scat was recorded in the overhang

## 5.3 Avoidance

### **Submissions – G7.10, G7.11, G7.12**

OEH recommends the degree to which impacts have been avoided be demonstrated by:

- *the inclusion of maps showing the additional two options that were considered in the development of the proposed modification;*
- *the inclusion of maps comparing the original and refined extension area footprints, which indicate those areas avoided;*
- *quantification of (hectares, communities and habitat) the area of impact avoided through both the chosen option compared with the other two options considered and any further modifications made to the proposed extension area footprints; and*
- *presenting a more detailed assessment of the mine site identifying cave bat breeding and roosting sites and related habitat. This assessment should also identify the extent to which cliffline habitat with features suited to bat roost sites has been avoided and will be protected on the site in-perpetuity.*

MCO acknowledges OEH's position on managing ecological impacts in accordance with a hierarchy of avoid, mitigate then compensate and has used its best endeavours to minimise ecological impacts as far as practicably possible in its design of the proposed open cut mine extension.

The majority of the coal resource within the Stage 1 project approval boundary is overlaid by land supporting potential species habitat. Temporary removal of this habitat could be avoided by not mining or by an alternative mining method such as underground or highwall mining. The former is the 'do nothing' option. The latter is uneconomic as described below. Given that some level of habitat removal cannot be avoided, MCO has presented a mine design that minimises its impacts, including impacts on biodiversity, through avoidance, mitigation and finally compensation for residual impacts (Section 5.9).

The proposed modification will enable the extraction of a substantial economically viable recoverable coal resource, being approximately 30 Million tonnes (Mt) of ROM coal. It is entirely within the existing Project Approval boundary and would allow for the continued orderly and economic development of land. The mine plan has been designed to enable a seamless transition from the approved to the proposed mining areas and promotes the utilisation of the existing infrastructure and workforce. The proposed modification accords with the *Mining Act 1992* and MCP mining lease requirements for MCO to maximise resource extraction subject to environmental, social and economic considerations.

The proposed modification will extend the substantial regional, local economic and social benefits from the Stage 1 operation. It will also promote the continuity of economic benefits to the local region from business expenditure, to the NSW Government in the form of royalties and to the Commonwealth Government in the form of company and income taxes. Overall, the proposed modification will have net production benefits to Australia of between \$188M and \$227M (refer to Section 8.10).

These benefits are reflected in the submissions received, with over 70% of the submissions received being in support of the proposed modification. Submissions of support were received from local community members, including individuals, local and regional businesses, and MCO employees.

Ultimately, the resource is in a fixed location. Extraction of the resource cannot happen without impact on species habitat. The ecological impacts of the proposal can, however, be mitigated including progressive rehabilitation of disturbed areas and provision of compensatory offsets.

The ecological study included a suite of mitigation measures (refer to Section 10.4.2 of the EA) developed in accordance with MCO's commitment for biodiversity mitigation that aims to achieve a 'maintain or improve' ecological outcome, resulting in a net positive biodiversity benefit in the post-development landscape. It also provided consideration to the progressive rehabilitation of disturbed areas that would occur concurrent with staged mining activities. MCO's commitment to progressive rehabilitation is demonstrated by its rehabilitation program for Open Cut 1, which to date has commenced rehabilitation of 130 ha of disturbed land (to the end of March 2013) with the objective of re-establishing Box Gum Woodland (EEC) and Sedimentary Ironbark Forest vegetation species (refer to Section 8.7) within the mine rehabilitation area.

In recognition of the sometimes unavoidable ecological impacts from projects, Commonwealth and NSW government policy has been developed to guide the preparation of compensation measures. In accordance with government policy, a substantial offset package has been prepared to compensate for residual impacts that cannot be avoided or mitigated. This is discussed in detail in Section 5.9 of this report. The offset package has been prepared to provide a net positive biodiversity outcome from the proposed modification.

The determining authority will make its decision based on the merits of the proposed modification. It will consider the trade-off between resource recovery and its associated social and economic benefits, and the residual social and environmental disbenefits, including the temporary impacts on ecology.

On consideration of these matters, an alternative response to the recommendations proposed by OEH has been provided below.

#### *The 'do nothing' option*

Under the 'do nothing' option, the 30 Mt resource would be sterilised and the attendant social and economic benefits would not be realised. In addition, benefits from any energy savings that may result from the improved mining efficiencies associated with the strategic realignment of open cut highwalls would not be realised.

#### *Alternative mining method*

The Stage 1 open cut mining areas, and the proposed extension areas, are in the centre and south of the Stage 1 project approval boundary. Options for both underground and highwall mining were assessed during the original development of the proposed modification, but were discounted as uneconomical as capital development costs of these options outweigh any economic gain. (Note the shape of the approved final highwalls is not conducive to maximising efficient resource recovery using highwall mining techniques).

As discussed in Section 4.2.1 of the EA, one of the main drivers for the proposed modification is the need to 'straighten-up' the boundaries of the highwalls and enable more efficient extraction, thus improving the cost competitiveness of the mine. (Note energy efficiency gains are expected as a result of more efficient extraction). The ability to straighten-up highwalls also allows for a safer mining environment, where the risk of vehicle and equipment collision is greatly reduced. This would not be possible adopting an alternative mining method.



### *Impact avoidance*

A number of configurations and extents were considered for the proposed extension areas, including diverting Moolarben Creek to enable Open Cut 2 to extend further to the south, extending Open Cut 2 further to the south-east adjacent to boundary of the Munghorn Gap Nature Reserve and extending Open Cuts 1 and 2 further to the east. Regarding avoiding diversion of Moolarben Creek, the riparian zone in this location has been previously cleared and grazed. Therefore, the removal of the southern extent of the proposed Open Cut 2 extension area from the mine plan was primarily to ensure the exclusion of Moolarben Creek and its floodplain. The avoidance of the riparian zone and associated habitats that these provide is a secondary benefit of the mine plan revision carried forward for approval. In its submission OEH notes that it is not clear how Open Cuts 1 and 2 could be extended further towards the eastern extent of the Stage 1 project approval boundary than the currently proposed expansion, given the current proposal already abuts the proposed Stage 2 underground area. Areas considered were located:

- adjacent to the northern section of Open Cut 1, between the approved Open Cut 1 boundary and the western edge of Underground 1; and
- to the east of Open Cut 2, encroaching on the western longwall panels of Underground 2.

As noted by OEH, the latter would have required changing the design of the proposed Stage 2 underground mine.

The area between the approved Open Cut 1 boundary and the western edge of Underground 1 contains approximately 79 ha of remnant vegetation that will not be directly impacted by the proposed open cut extension.

The area to the east of the Open Cut 2, encroaching on the western longwall panels of Underground 2 contains approximately 185 ha of predominately remnant vegetation that will not be directly impacted by the proposed open cut extension.

An area of approximately 12.5 ha to the south and south-east of the proposed Open Cut 2 extension area was not progressed further due to the need to divert Moolarben Creek and the close proximity of the area to Munghorn Gap Nature Reserve.

*OEH recommends that the level of avoidance adopted in the context of the level of significance of the impacts associated with the proposal and the cumulative impact of all mining operations in the area should be justified.*

Box Gum Woodland (EEC), microbats and woodland birds are the main taxa that may be significantly impacted by the proposed modification. As indicated above, MCO did not progress with the request for approval of alternate mine plans that would further impact on habitat for these species or that would have required the diversion of Moolarben Creek. As described in the ecological assessment for the proposed modification (EA Appendix E), the MCP and proposed mine extension area is located in the Western Coalfields within the western limit of the Hunter-Central Rivers Catchment Management Authority (CMA) area. Locally the MCP and proposed mine extension area is situated within the Kerrabee subregion of the Hunter-Central Rivers CMA area. In addition to the MCP, the Kerrabee CMA subregion also hosts the Ulan and Wilpinjong mines.

These three coal mines (approved and proposed) account for impacts to 2.3% of remnant vegetation outside the extensive conservation areas in the Kerrabee CMA subregion. Of this, the proposed modification accounts for 0.12% of subregion impacts or 5% of the cumulative impacts in the immediate area of the mines (ie Ulan, Moolarben and Wilpinjong localities). This is discussed further in Section 5.7 below. The cumulative impact on Box Gum Woodland (EEC) in the local and regional context as a result of the proposed modification is therefore not considered to be significant. Note habitat for threatened species is well represented in local conservation areas, with approximately 47% of remnant native vegetation within the the Kerrabee CMA subregion protected in the conservation reserve network.

Notwithstanding, MCO has proposed an offset strategy that more than adequately compensates for the short-term impacts on native vegetation and fauna species and habitat from the proposed mine extension. Along with the Stage 1 offsets which improve and enhance habitat in degraded areas, the proposed offset package for the modification will contribute to the amount of habitat conserved in the locality and subregion for threatened biodiversity. Offsets for the proposed modification contribute, not insubstantially, to the cumulative amount of woodland (10%) and grassland (15%) conserved by the three mining projects (refer Table 5.5 below), providing habitat for threatened fauna species. This is in addition to the proposed progressive rehabilitation of the mining area. The cumulative impact on threatened fauna in the local and regional context, is therefore not considered to warrant further avoidance measures to be undertaken for the proposed modification.

*OEH has indicated that "Adoption of a two-stage gradual clearing protocol where non-habitat trees are cleared 24 hours prior to any habitat trees being cleared, to encourage fauna to move out of an area prior to impact" is not an avoidance measure.*

This is acknowledged by MCO.

## 5.4 Additional disturbance

**Submissions** – S1.10, S2.1, S3.7, S4.13, S4.16, S4.17, S4.19, S4.22, C3.2, C5.4, C6.1, C8.3, C9.6, C9.8, C10.2, C11.2, C14.3, C15.3, C15.9, C16.3, C17.2, C18.5, C19.7, C21.6, C24.4, C25.2, C26.2, C27.2, C28.5, C29.2, C31.2, C31.5, C32.5, C33.5, C34.3, C35.2, C37.4, C39.28, C40.4, C40.6, C41.2, C43.2

*A number of submissions raise vegetation disturbance from the proposed modification and its associated impacts. Submissions generally focus on:*

- *the area of woodland habitat to be disturbed (171.4 ha), including 16.5 ha of the EPBC Act listed critically endangered White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland;*
- *impacts on significant birds recorded namely the Common Koel, Emu, Jacky Winter, Eastern Yellow Robin, Rufous Whistler; threatened birds, namely, Turquoise Parrot, Diamond Firetail, Brown Treecreeper, Regent Honeyeater and Barking Owl; and the threatened fauna namely the Eastern Cave Bat; and*
- *removal of sandstone ridgeline habitat.*

It is acknowledged that the proposed modification would result in the gradual clearance of 171.4 ha woodland habitat, including 16.5 ha of critically endangered (EPBC Act listed) White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland (or 17.2 ha of Box Gum Woodland EEC listed under the TSC Act). Disturbance areas will continue to be progressively rehabilitated with representative endemic native species as described in MCO's existing approved LMP and Mining Operations Plan (MOP) for Stage 1.

Avoidance and mitigation measures have reduced the impact to some common and threatened fauna species, however residual impacts are likely for woodland birds such as those identified above, and rocky habitat for microbat species. Substantial habitat resources for such species occur outside the disturbance footprint. Two areas protected under the conservation reserve network occur in proximity to the proposed extension areas, namely, the Goulburn River National Park, covering an area of approximately 72,000 ha, and Munghorn Gap Nature Reserve, covering an area of approximately 6,000 ha. As described above these conservation areas cover 47% of the Kerrabee CMA subregion, in which the modification is located. The disturbance area under the proposed modification represents 0.002% when compared to the areas conserved in the nearby conservation reserves.

Further, open forest and woodland to be progressively cleared and then re-established represents less than 0.12% of the remnant forest and woodland habitat outside of conservation areas in the Kerrabee CMA sub-region. Therefore, the overall removal of vegetation and threatened fauna habitat associated with the proposed modification is considered to be minor in the local and regional context.

Offsets to compensate for these residual impacts on habitat have been strategically chosen (refer to response at Section 5.9 for more detailed discussion regarding offsets). Offsets will provide for the conservation and enhancement of 'like for like' vegetation and habitat identified within the proposed extension areas. The offsets will increase the amount of habitat for woodland birds and microbats (including rock outcrop habitat) protected in the long-term for biodiversity in the local area and region.

## 5.5 Habitat connectivity

### Submissions – C9.9, C34.3

*Two submissions note the importance of the linkage between the Goulburn River National Park and the Munghorn Gap Nature Reserve and its maintenance. One respondent believed that this would not be maintained if both Stage 2 and Stage 1 of the MCP as modified were approved.*

The proposed modification will not impact on the conservation values of the Goulburn River National Park or Munghorn Gap Nature Reserve and will have minimal impact on the retained vegetation corridor that provides a link between these two reserves.

In addition, MCO's rehabilitation and biodiversity offsetting vision is to create, enhance and protect strategic wildlife corridor links between the Goulburn River National Park and Munghorn Gap Nature Reserve with large areas of remnant vegetation to the west and north-west of the MCP.

## 5.6 Threatened species

### Submission – G7.4

*OEH recommends that a clear summary of expected impacts to threatened species and their habitats, based on adequate assessment of habitat in the modification areas be provided. This should be reflected in the required biodiversity credits.*

OEH's submission identifies some inconsistencies with the amount of habitat for threatened species reported in the EA and ecological study (EA Appendix E). It is agreed that several different impact figures were presented in the ecological study for threatened fauna species. These minor typographic errors have been corrected in the following tables. A summary of the threatened fauna habitats to be removed for the proposed modification is provided in Table 5.2, while a summary of the impacts for each species is presented in Table 5.3.

As per OEH's recommendation, the corrected disturbance extents have been reflected in the determination of the offset package (Appendix E).

**Table 5.2 Fauna habitat removed for the proposed modification**

Habitat type	Area to be cleared (ha)	Associated threatened fauna species
Open forests on hillsides and ridges	153.5	Broad-headed Snake*, Brown Treecreeper, Black-chinned Honeyeater, East-coast Freetail Bat, Eastern Bentwing Bat, Eastern Cave Bat, East-coast Freetail Bat, Eastern False Pipistrelle, Gilbert's Whistler**, Glossy Black-cockatoo, Greater Broadnosed Bat, Koala***, Large-eared Pied Bat, Little Bentwing Bat, Little Pied Bat, Masked Owl, Painted Honeyeater****, Powerful Owl, Regent Honeyeater****, Scarlet Robin, Spotted-tail Quoll*, Varied Sittella and Yellow-bellied Sheathtail Bat
Footslope grassy woodlands	17.2	Eastern Bentwing Bat, Eastern Cave Bat, East-coast Freetail Bat, Eastern False Pipistrelle, Flame Robin, Grey-crowned Babbler, Hooded Robin, Koala***, Little Bentwing Bat, Little Eagle, Little Lorikeet, Little Pied Bat, Painted Honeyeater, Regent Honeyeater, Southern Long-eared Bat, Squirrel Glider, Speckled Warbler, Turquoise Parrot and Yellow-bellied Sheathtail Bat
Riparian grassy woodlands	0.7	Black-breasted Buzzard, Diamond Firetail, Eastern Cave Bat, East-coast Freetail Bat, Eastern False Pipistrelle, Flame Robin, Hooded Robin, Little Bentwing Bat, Little Eagle, Little Lorikeet, Little Pied Bat, Turquoise Parrot, Southern Long-eared Bat, Speckled Warbler, Spotted Harrier, Square-tailed Kite, Squirrel Glider and Yellow-bellied Sheathtail Bat
Exotic pasture	6.6	Diamond Firetail, Spotted Harrier, Turquoise Parrot and Yellow-bellied Sheathtail Bat
<b>Total</b>	<b>178</b>	<b>-</b>

Notes \*The Broad-headed Snake and Spotted-tail Quoll are only associated with Ridgetop Broad-leaved Ironbark Grey Gum Forest, therefore potential habitat removal is 96.8 ha.

\*\*Gilbert's Whistler is only associated with Shrubby White Box Forest, therefore potential habitat removal is 13.3ha.

\*\*\*The Koala is associated with Shrubby White Box Forest, Footslope Grassy Woodlands and Ridgetop Broad-leaved Ironbark Grey Gum Forest, therefore potential habitat removal is 30.5 ha of secondary and 96.8 ha of supplementary habitat.

\*\*\*\*Regent Honeyeater and Painted Honeyeater habitat in open forests on hillsides and ridges is only represented in Shrubby White Box Forest, therefore is equal to 30.5 ha when combined with Footslope Grassy Woodlands.

**Table 5.3 Summary of potential impacts to threatened species, populations and communities recorded, or likely to occur, in the proposed extension areas**

Threatened biodiversity	Conservation status		Recorded in the proposed extension areas	Impact description	Likely significance of impact after mitigation is applied <sup>1</sup>
	TSC Act	EPBC Act			
<b>Flora</b>					
Pine Donkey Orchid ( <i>Diuris tricolor</i> )	V	-	No	Removal of 7 ha of potential habitat	Not significant
<b>Reptiles</b>					
Broad-headed Snake ( <i>Hoplocephalus bitorquatus</i> )	V	-	No	Removal of 96.8 ha of potential habitat	Not significant
<b>Birds</b>					
Barking Owl ( <i>Ninox connivens</i> )	V	-	No	Removal of 153.5 ha of potential habitat	Not significant

**Table 5.3 Summary of potential impacts to threatened species, populations and communities recorded, or likely to occur, in the proposed extension areas**

Threatened biodiversity	Conservation status		Recorded in the proposed extension areas	Impact description	Likely significance of impact after mitigation is applied <sup>1</sup>
	TSC Act	EPBC Act			
Black-breasted Buzzard ( <i>Hamirostra neanosternon</i> )	V	-	No	Removal of 0.7 ha potential habitat	Not significant
Black-chinned Honeyeater (eastern subspecies) ( <i>Melithreptus gularis gularis</i> )	V	-	No	Removal of 30.5 ha of potential habitat	Not significant
Brown Treecreeper ( <i>Climacteris picumnus victoriae</i> )	V	-	Yes	Removal of 153.5 ha of habitat	Significant <sup>1</sup>
Diamond Firetail ( <i>Stagonopleura guttata</i> )	V	-	Yes	Removal of 7.3 ha of known habitat	Not significant
Flame Robin ( <i>Petroica multicolor</i> )	V	-	No	Removal of 17.9 ha of potential habitat	Not significant
Gang-gang Cockatoo ( <i>Callocephalon fimbriatum</i> )	V	-	No	Removal of 153.5 ha of potential habitat	Not significant
Gilbert's Whistler	V	-	No	Removal of 13.3 ha of breeding and foraging habitat	Not significant
Glossy Black-Cockatoo ( <i>Calyptorhynchus lathami</i> )	V	-	No	Removal of 29.1 ha of potential habitat	Not significant
Grey-crowned Babbler (eastern subspecies) ( <i>Pomatostomus temporalis temporalis</i> )	V	-	No	Removal of 17.2 ha of potential habitat	Not significant
Hooded Robin (south-eastern form) ( <i>Melanodryas cucullata cucullata</i> )	V	-	No	Removal of 17.9 ha of potential habitat	Not significant
Little Eagle ( <i>Hieraeetus morphnoides</i> )	V	-	No	Removal of 17.9 ha of potential habitat	Not significant
Little Lorikeet ( <i>Glossopsitta pusilla</i> )	V	-	No	Removal of 17.9 ha of potential habitat	Not significant
Masked Owl ( <i>Tyto novaehollandiae</i> )	V	-	Yes	Removal of 153.5 ha of habitat	Not significant
Painted Honeyeater ( <i>Grantiella picta</i> )	V	-	No	Removal of 30.5 ha of potential habitat	Not significant
Powerful Owl ( <i>Ninox strenua</i> )	V	-	Yes	Removal of 153.5 ha of known habitat	Not significant
Regent Honeyeater ( <i>Anthochaera phrygia</i> )	CE	E	No	Removal of 30.5 ha of potential foraging habitat	Not significant
Scarlet Robin ( <i>Petroica boodang</i> )	V	-	No	Removal of 153.5 of potential habitat	Not significant
Speckled Warbler ( <i>Chthonicola sagittatus</i> )	V	-	No	Removal of 17.9 ha of potential habitat	Not significant
Spotted Harrier ( <i>Circus assimilis</i> )	V	-	No	Removal of 7.3 ha of potential habitat	Not significant

**Table 5.3 Summary of potential impacts to threatened species, populations and communities recorded, or likely to occur, in the proposed extension areas**

Threatened biodiversity	Conservation status		Recorded in the proposed extension areas	Impact description	Likely significance of impact after mitigation is applied <sup>1</sup>
	TSC Act	EPBC Act			
Square-tailed Kite ( <i>Lophoictinia isura</i> )	V	-	No	Removal of 171.4 ha of potential habitat	Not significant
Swift Parrot ( <i>Lathamus discolor</i> )	E	E	No	Removal of 30.5 ha potential foraging habitat	Not significant
Turquoise Parrot ( <i>Neophema pulchella</i> )	V	-	Yes	Removal of 24.5 ha of known habitat	Not significant
Varied Sittella ( <i>Daphoenositta chrysoptera</i> )	V	-	No	Removal of 171.4 ha potential habitat	Not significant
<b>Mammals</b>					
Eastern Bentwing Bat ( <i>Miniopterus schreibersii oceanensis</i> )	V	-	Yes	Removal of approximately 171.4 ha of foraging habitat	Not significant
Eastern Cave Bat ( <i>Vespadelus troughtoni</i> )	V	-	Yes	Removal of 171.4 ha of habitat comprising 3km rock outcrop (potential breeding) and 171.4 ha of foraging habitat	Significant <sup>1</sup>
East-coast Freetail Bat ( <i>Mormopterus norfolkensis</i> )	V	-	No	Removal of 171.4 ha of potential habitat	Not significant
Eastern False Pipistrelle ( <i>Falsistrellus tasmaniensis</i> )	V	-	No	Removal of 171.4 ha of potential habitat	Not significant
Greater Broad-nosed Bat ( <i>Scoteanax rueppellii</i> )	V	-	No	Removal of 153.3 ha of potential habitat	Not significant
Koala ( <i>Phascolarctos cinereus</i> )	V	V	No	Removal of 30.5 ha potential secondary and 96.8 ha potential supplementary habitat	Not significant
Large-eared Pied Bat ( <i>Chalinolobus dwyeri</i> )	V	V	No	Removal of 171.4 ha of potential foraging habitat	Not significant
Little Bentwing Bat ( <i>Miniopterus australis</i> )	V	-	No	Removal of 171.4 ha of potential foraging habitat	Not significant
Little Pied Bat ( <i>Chalinolobus picatus</i> )	V	-	No	Removal of 171.4 ha of potential foraging and breeding habitat	Not significant
Southern Long-eared Bat ( <i>Nyctophilus corbeni</i> )	V	V	No	Removal of 171.4 ha of potential habitat	Not significant
Spotted-tailed Quoll ( <i>Dasyurus maculatus</i> )	V	E	No	Removal of 96.8 ha of potential habitat	Not significant
Squirrel Glider ( <i>Petaurus norfolcensis</i> )	V	-	No	Removal of 17.9 ha of potential habitat	Not significant

**Table 5.3 Summary of potential impacts to threatened species, populations and communities recorded, or likely to occur, in the proposed extension areas**

Threatened biodiversity	Conservation status		Recorded in the proposed extension areas	Impact description	Likely significance of impact after mitigation is applied <sup>1</sup>
	TSC Act	EPBC Act			
Yellow-bellied Sheathtail Bat ( <i>Saccolaimus flaviventris</i> )	V	-	No	Removal of 178 ha of potential habitat	Not significant

Note: 1. Significance of impact does not account for impact mitigation from mine site rehabilitation or compensatory offset habitat area.

## 5.7 Cumulative impacts

**Submissions** – S1.14, S3.5, S3.6, S4.8, S4.14, S4.20, S4.23, S4.31, C5.7, C13.6, C19.16, C37.2, C43.2, G7.6, G7.8, G7.9

*Submissions generally relate to cumulative impacts with approved Stage 1 operations and proposed Stage 2 operations, and with other mines in the area, on biodiversity. OEH recommends that the cumulative impact (including both direct and indirect impacts) on the vegetation communities, threatened species habitat and connectivity be presented.*

The following response considers all threatened species, populations and communities recorded or likely to occur in the proposed extension area.

Cumulative impacts are the successive, incremental and combined impacts of one or more activities on society, the economy and the environment. Cumulative impacts result from the accumulation and interaction of impacts from past, present or future activities. They can be both positive and negative and can vary in intensity as well as spatial and temporal extent (Franks *et al.* 2010). The loss of native vegetation and habitat values in the study area from the proposed modification, may combine spatially and temporally to result in negative cumulative impacts locally and within the region. However, the proposed offset areas will also result in positive, beneficial outcomes for threatened biodiversity and combine spatially and temporally to result in positive cumulative impacts locally and within the region.

The proposed modification is in the western coalfield of NSW. Within the locality of the proposed modification, three coal mines: Moolarben, Ulan and Wilpinjong occur. Stage 2 of the MCP is currently being assessed by the DP&I. The modification adds to the local cumulative impacts on one threatened ecological community, one threatened flora species, 17 threatened bird and 10 threatened mammal species.

As described in Section 5.3 above, the MCP, proposed modification and adjacent Ulan and Wilpinjong Coal Mines are situated in the Kerrabee subregion of the Hunter-Central Rivers CMA area. Locally the three mines occur within the adjoining Ulan, Moolarben and Wilpinjong localities.

The cumulative impacts of the proposed modification have been quantified by assessing the contribution of the proposed direct clearing impacts on threatened species and communities within the local (Ulan, Moolarben, Wilpinjong localities) and regional (Kerrabee CMA subregion) areas. Impacts on threatened biodiversity in the local area have been determined using available data presented in ecological assessments prepared for the respective mines. Table 5.4 presents a summary of the impacts to threatened biodiversity across the projects, with a summary of the proposed modification's local contribution to cumulative impacts for key species.

The proposed modification will contribute between 1% and 13% of cumulative impacts in the locality for the range of threatened biodiversity identified in the proposed extension areas or with a high likelihood of occurring (Table 5.4).

The three mine projects (approved and proposed) account for impacts to 2.3% of remnant vegetation outside conservation reserves in the regional area. (Note approximately 47% of the regional area is set aside in existing conservation reserves). Of this, the proposed modification accounts for 5% of these impacts (or 0.12% across the entire regional area).

The cumulative impact of the proposed modification on threatened species and Box Gum Woodland (EEC) is therefore considered to be minor when compared with surrounding coal projects, and in the context of the proposed extension areas, which are surrounded by high-quality habitat provided by the conservation reserve network and adjoining remnant vegetation.

The proposed modification would contribute less than 5% of the cumulative impact to Box Gum Woodland (EEC) in the local area, when considering surrounding coal mines. Further, the proposed modification would contribute less than 6% of the cumulative impacts on habitat for the Pine Donkey Orchid, the only threatened flora species which may occur in the proposed extension areas given recent local records. The combined cumulative impact on Pine Donkey Orchid habitat represents only 0.39% of the identified habitat in the regional area for this species. Suitable habitat across the CMA subregion and the proposed modification has been determined from the associated vegetation types listed for this species in the CMA on the OEH threatened species profile database (OEH 2012).

The proposed modification will also contribute to cumulative impacts on habitat for threatened owls in the local area ranging from 9% to 12%. The proposed modification will also result in approximately 13% of the cumulative impacts in the local area to foraging habitat for the Gang-gang Cockatoo. However, the combined cumulative impact from coal projects in the regional area on threatened owl and Gang-gang Cockatoo habitat represents only 0.55% and 0.58% of potential habitat, respectively. The modification only accounts for impacts to 0.05% of these cumulative impacts in the regional area. This loss is considered to be minor given the mobility of these species and availability of habitat in surrounding conservation reserves.

A significant impact after mitigation was predicted for the modification's impacts on the Brown Treecreeper in the ecological study. Progressive rehabilitation and biodiversity offset areas have been selected to compensate for this habitat loss to the species. The proposed modification will contribute approximately 8% to cumulative impacts on this species in the local area. The combined cumulative impact on the Brown Treecreeper habitat represents approximately 0.61% of identified habitat for this species in the regional area, of which the modification only represents 0.05%. Cumulative impacts on this species are not considered to be significant in the local area or CMA subregion.



**Table 5.4 Cumulative local area mine impacts on threatened biodiversity**

Threatened biodiversity	Quantification of impacts on habitat (ha)					Total cumulative impacts (ha)	Proportion due to proposed modification
	Proposed MCP modification	Approved MCP Stage 1	Approved Wilpinjong Coal Mine	Approved Ulan Coal Mine	Proposed MCP Stage 2		
<b>Threatened ecological communities</b>							
Box Gum Woodland (EEC)	17 ha (7 ha derived native grassland)	65 ha	47 ha	69 ha	123 ha	321 ha	5%
<b>Threatened flora</b>							
Pine Donkey Orchid	7 ha potential	0.25 ha known	None identified	27 ha potential	82 ha potential	116.25 ha	6%
<b>Threatened birds</b>							
Barking Owl	154 ha potential	416 ha potential	290 ha potential	323 ha known	123 ha known	1,306 ha	12%
Black-chinned Honeyeater	31 ha potential	65 ha potential	47 ha known	323 ha known	707 ha known	1,173 ha	3%
Brown Treecreeper	154 ha known	224 ha known	290 ha known	323 ha known	851 ha known	1,842 ha	8%
Diamond Firetail	7 ha known	224 ha known	290 ha known	407 ha known	27.8 ha known	956 ha	1%
Gang-gang Cockatoo	154 ha potential	172 ha potential	290 ha <sup>1</sup> known	323 ha known	239 ha <sup>1</sup> potential	1,178 ha	13%
Gilbert's Whistler	13 ha potential	160 ha potential	No direct impact	No direct impact	283 ha potential	456 ha	3%
Glossy Black-cockatoo	29 ha potential	170 ha known	290 ha known	407 ha known	No direct impact	896 ha	3%
Grey-crowned Babbler	17 ha potential	82 ha known	290 ha known	407 ha known	123 ha known	919 ha	2%
Hooded Robin	18 ha potential	215 ha known	290 ha known	407 ha known	47 ha known	977 ha	2%
Masked Owl	154 ha known	30 ha potential	290 ha potential	407 ha potential	449 ha potential	1,329 ha	12%
Painted Honeyeater	31 ha potential	264 ha known habitat	290 ha known	407 ha known	84 ha known	1,076 ha	3%
Powerful Owl	154 ha known	416 ha known	290 ha known	407 ha known	449 <sup>1</sup> ha potential	1,715 ha	9%
Regent Honeyeater	31 ha potential	160 ha habitat	47 ha known	None identified	90 ha potential	328 ha	9%
Speckled Warbler	18 ha potential	189 ha known	290 ha known	323 ha known	126 ha known	946 ha	2%
Square-tailed Kite	171 ha potential	416 ha known	290 ha known	407 ha potential	126 ha known	1,410 ha	12%
Swift Parrot	31 ha potential	416 ha potential	290 ha potential	323 ha known	489 ha potential	1,549 ha	2%
Turquoise Parrot	25 ha known	88 ha potential	290 ha known	407 ha known	489 ha potential	1,299 ha	2%

**Table 5.4 Cumulative local area mine impacts on threatened biodiversity**

Threatened biodiversity	Quantification of impacts on habitat (ha)					Total cumulative impacts (ha)	Proportion due to proposed modification
	Proposed MCP modification	Approved MCP Stage 1	Approved Wilpinjong Coal Mine	Approved Ulan Coal Mine	Proposed MCP Stage 2		
<b>Threatened mammals</b>							
Eastern Bentwing Bat	171 ha habitat	416 ha known	290 ha known	323 ha habitat	489 ha potential	1,689 ha	10%
	3km rock outcrop <sup>2</sup>	None identified	0.2 km rock outcrop <sup>1</sup>	12km rock outcrop	None identified	15 km	20%
Eastern Cave Bat	171 ha known	416 ha potential	290 ha potential	323 ha potential	489 ha potential	1,689 ha	10%
	3km rock outcrop <sup>2</sup>	None identified	0.2 km rock outcrop <sup>1</sup>	12km rock outcrop	None identified	15 km	20%
East-coast Freetail Bat	171 ha potential	416 ha potential	290 ha <sup>1</sup> known	323 ha potential	489 ha <sup>1</sup> potential	1,689 ha	10%
Eastern False Pipistrelle	171 ha potential	416 ha potential	290 ha <sup>1</sup> known	323 ha potential	489 ha <sup>1</sup> potential	1,689 ha	10%
Large-eared Pied Bat	171 ha potential	416 ha known	290 ha known	323 ha habitat	489 ha known	1,689 ha	10%
	3km rock outcrop <sup>2</sup>	None identified	0.2 km rock outcrop	12km rock outcrop (maternity site)	None identified	15 km	20%
Little Bentwing Bat	171 ha potential	416 ha potential	290 ha known	323 ha potential	851 ha potential	2,051 ha	8%
	3km rock outcrop	None identified	0.2 km rock outcrop	12km rock outcrop	None identified	15 km	20%
Little Pied Bat	171 ha known	416 ha known	290 ha potential	323 ha potential	851 ha known	2,051 ha	8%
	3km rock outcrop <sup>2</sup>	None identified	0.2 km rock outcrop	12km rock outcrop	None identified	15 km	20%
Southern Long-eared Bat	171 ha potential	416 ha known	290 ha potential	407 ha known	287 ha potential	1,571 ha	11%
Squirrel Glider	18 ha potential	138 ha known	290 ha potential	407 ha known	489 ha potential	1,342 ha	1%
Yellow-bellied Sheath-tail Bat	178 ha potential	416 ha known	290 ha known	407 ha known	852 ha potential	2,143 ha	8%

Notes: 1. Where habitat areas impacted were not provided in assessments, these have been inferred from areas of vegetation communities that would provide habitat for the species.

2. It is noted that out of the 3 km rocky outcrop identified for the proposed modification only 5 m has been identified in one outcrop structure as recently providing microbat roosting sites, resulting in highly conservative estimates of the proportion due to the proposed modification.

Sources: Moolarben Biota 2006; Mount King Ecological Surveys 2005; Greg Richards and Associates 2005; Umwelt 2009.

The contribution of the proposed modification to cumulative impacts for other key threatened species recorded in the proposed extension areas, or for which potential habitat is present, is also considered minor in the local area. The contribution of the proposed modification on the Regent Honeyeater is approximately 9% of potential habitat to be or that has been impacted in the local area. This contribution is not considered to be significant considering the existing habitat within adjacent surrounding conservation reserves, especially Munghorn Gap Nature Reserve where it is frequently observed foraging. The combined cumulative impact on Regent Honeyeater habitat represents approximately 0.12% of impacts on identified habitat in the regional area for this species from coal projects, of which the modification only represents a minor contribution (0.01%). Additionally, large areas of Box Gum Woodland (EEC) containing key eucalypt species (Blakely's Red Gum, White Box and Yellow Box) are present in the proposed biodiversity offset areas which will protect and enhance key foraging areas for the species in the locality into the future.

The proposed modification will contribute up to 10% to the loss of microbat foraging habitat (both cave and tree-roosting species) in the local area from mining projects. The combined cumulative impact on microbat foraging habitat represents approximately 0.51% of the habitat in the regional area for such species, of which the modification represents 0.05%.

Significant impacts were predicted for the Eastern Cave Bat given the removal of a rocky outcrop that has the potential to be a maternity site. Known maternity roosts for cave roosting bat species have been identified in the local area at the Ulan Coal Mine and in adjoining conservation reserve areas. The proposed modification conservatively contributes approximately 20% (3 km) of the cumulative impacts on potential roosting habitat for cave-roosting bat species in the local area from mining projects. While 3 km of rock outcrop will be removed by the modification, only a small proportion (5 m or 0.17%) of this has been assessed as being potentially used for roosting and breeding by the Eastern Cave Bat.

It is difficult to estimate the amount of rock outcrop habitat available in the region for cave-roosting bat species. However, such habitat is well known in the conservation reserve networks in the subregion, particularly the Goulburn River National Park. Importantly, 47% of the CMA subregion is protected in conservation reserve network. Despite this, the proposed modification's impacts on rock outcrop habitat will be compensated through the protection and enhancement of similar habitat in the proposed offsets areas which include at least 7.6 km of mapped rock outcrops with potential roosting sites.

The BOS/BOP for the proposed modification contributes to the local conservation and enhancement of habitat for the range of threatened biodiversity identified in the proposed extension areas. The BOS/BOP will provide an additional 19% of protected Box Gum Woodland (EEC), when considering the biodiversity offsets for all approved and proposed coal projects in the local area (Table 5.5). This is despite the proposed modification contributing only 5% to the cumulative impacts from coal projects on this vegetation community in the local area. This is a substantial increase in the amount of Box Gum Woodland (EEC) to be protected and enhanced in the local area into the future.

Offsets for the proposed modification also contribute, not insubstantially, to the amount of woodland (10%) and grassland (15%) to be conserved by the three mining projects, providing habitat for threatened fauna species (Table 5.5). This is in addition to the proposed progressive rehabilitation of the mining area and protection and enhancement of vegetation undertaken outside of offset sites for the mining projects in the local area. The proposed offset package also contains at least 7.6 km of potential roosting and breeding rock outcrop habitat for microbat species recorded in the proposed extension areas.

**Table 5.5 Cumulative beneficial habitat outcomes for threatened biodiversity**

Threatened biodiversity habitat	Quantification of impacts on habitat (ha) <sup>1</sup>					Total cumulative impacts (ha)	Proposed modification's proportion of cumulative impacts
	Proposed MCP modification	Approved MCP Stage 1	Approved Wilpinjong Coal Mine	Approved Ulan Coal Mine	Proposed MCP Stage 2		
Grassland	211 ha	0 ha	380 ha	0 ha	850 ha	1,441 ha	15%
Woodland	713 ha	1,549 ha	480 ha	1,492 ha	2,654 ha	6,888 ha	10%
Box Gum Woodland (EEC) <sup>2</sup>	324 ha	168 ha	150 ha	408 ha	620 ha	1,670 ha	19%

Note: 1. Offset calculations do not include rehabilitation of mining areas or indirect offsets such as research funding and have been determined with available information and are indicative only.

2. Box Gum Woodland is included in the presented quantum for Woodland, but due to the significance of this community is presented separately.

Sources: Moolarben Biota 2006; Mount King Ecological Surveys 2005; Greg Richards and Associates 2005; Umwelt 2009; Cumberland Ecology 2012.

OEH recommends that the revised cumulative impact assessment and any additional assessment of cave roosting microbat habitat is taken into account in the threatened species assessments, including conclusions regarding the likely significance of impacts on these species. Although not included in its recommendations, OEH also raises issues with the assessment of the Regent Honeyeater and other threatened, and declining, woodland birds.

The OEH submission requested further assessment of cumulative impacts for the Regent Honeyeater and microbats on potential habitat impacted, either directly or indirectly, by the proposed modification. Of particular concern, OEH identifies habitat fragmentation and impacts on dispersal, and loss of foraging resources, for woodland birds to be a major contributing factor to the decline of such species.

The National Recovery Plan for the Regent Honeyeater (Menkhorst, Schedvin and Geering 1999) recognises that the species prefers wetter, more fertile sites along creek flats and lower slopes, and that their key forage species include White Box (*E. albens*), Yellow Box (*E. melliodora*) and Mugga Ironbark (*E. sideroxylon*). These key foraging species were confirmed by an expert on the species (David Geering of OEH, pers. comm. 15 January 2013). Approximately 30.5 ha of the proposed extension areas contain one of the key foraging species, White Box. This only represents 0.2% of vegetation dominated by White Box in the Kerrabee CMA subregion. The removal of this area is not expected to significantly impact the species given the small-scale removal of potential foraging habitat and the extent of existing known habitat within the adjacent conservation reserve network and remnant vegetation.

Footslope woodland and open forest has been identified by OEH in its submission as important habitat for the Regent Honeyeater and other threatened woodland birds, as valley floor vegetation has been largely cleared for agricultural and rural lifestyle development. While forests in the proposed extension areas contain Grey Gum (*Eucalyptus punctata*) which is an identified resource for the species, this is considered secondary foraging habitat for the species and has been assessed as such. The adjacent Munghorn Gap Nature Reserve, which was originally established as a fauna reserve, is especially important as the species is frequently observed foraging in this area.

Cumulative impacts on the Regent Honeyeater are discussed in the response above. The combined cumulative impact on Regent Honeyeater habitat in the locality from coal projects represents approximately 0.12% of identified habitat in the Kerrabee CMA subregion for this species, of which the modification represents 0.01% of impacts. Therefore, the cumulative impacts from the proposed modification are still not considered to be significant for the Regent Honeyeater, given the minor nature of the proposed modification and abundance of species habitat in the local and regional areas (as previously described).

Large areas of mature Box Gum Woodland (EEC) (166.69 ha excluding DNG) containing key eucalypt species (Blakely's Red Gum, White Box and Yellow Box) are present in the updated biodiversity offsets, as well as secondary tree species identified by OEH in its submission. In addition, the proposed modification adds to the beneficial cumulative impacts of mining projects in the locality through the proposed offsets and rehabilitation which will include key tree species. The combination of these beneficial outcomes will protect and enhance key foraging resources in the immediate and medium-term, through to the long-term for the species in the locality and region.

Cumulative impacts on other woodland birds are discussed in the response above. The cumulative impacts from mine projects in the local area only account for impacts to 5% of remnant native vegetation outside conservation reserves in the Kerrabee CMA subregion. The proposed modification only accounts for 0.1% of impacts within this regional area. This is not considered to be significant for other woodland birds in the Kerrabee CMA subregion.

Roosting habitat in the proposed extension areas is considered to be marginal for the Large-eared Pied Bat. The approximately 3 km of rock outcrop planned for removal in the proposed extension areas was assessed for suitability and searched for signs of the species presence. Rock outcrops in the proposed extension areas are comprised of shallow outcrop with cracks and fissures, and some rock overhangs. Only one area showed evidence of occupation by microbats, including microbat scat. Given the shallow nature of the outcrops, this area was not considered suitable roosting habitat for Large-eared Pied Bat and was determined to most likely be an Eastern Cave Bat roosting site. Limited suitable roosting and breeding habitat occurs in the proposed extension areas for the Large-eared Pied bat as this species requires roof domes of sandstone caves for breeding and prefers this habitat for roosting.

Significant impacts were predicted for the Eastern Cave Bat given the removal of a rocky outcrop that has the potential to be a maternity site. Impacts on the Large-eared Pied Bat were not considered to be significant. The proposed modification conservatively contributes approximately 20% (3 km) of the cumulative impacts from mining projects in the local area to potential roosting habitat for cave-roosting bat species. It is important to note that not all of the entire 3 km length of rock outcrop presents likely or potential microbat habitat and only a small proportion (5 m or 0.17%) of the rock outcrop was determined to be currently used as roosting and/or breeding habitat, potentially by the Eastern Cave Bat. Similar habitat is well known in the conservation reserve networks in the Kerrabee CMA subregion, particularly the Goulburn River National Park and the Munghorn Gap Nature Reserve, which specifically preserves rock pagoda formations. Importantly, as described elsewhere, 47% of the CMA subregion is protected by the conservation reserve network.

In consideration of cumulative impacts on cave-roosting microbats, impacts to the Large-eared Pied Bat are not considered significant, however significant impacts on potential habitat are still likely for the Eastern Cave Bat. The proposed modification's unavoidable impacts on rock outcrop habitat will be compensated through the protection and enhancement of similar habitat in the proposed offsets areas which include at least 7.6 km of mapped rock outcrops with potential roosting sites (see Photograph 1.3).

*OEH recommends that conclusions regarding water quality and flow regime impacts on biodiversity as a result of the combined mining projects in the area be presented.*

The 'alteration to natural flow regimes of rivers and streams and their floodplains and wetlands' is listed as a Key Threatening Process (KTP) under the TSC Act.

Both the surface water study (EA Appendix I) and the groundwater study (EA Appendix J) undertook cumulative assessments of the proposed modification combined with the other stages (approved and proposed) of the MCP and the Wilpinjong and Ulan Coal Mines.

The surface water study indicates that the proposed modification will have a negligible impact on the quality of surface runoff and receiving waters. Water quality will be managed through the design of the modification and management measures adopted during clearing, operation and rehabilitation of the proposed extension areas. As such, no water quality impacts are anticipated to impact on biodiversity and the proposed modification will not add to any cumulative impacts in the locality.

The groundwater study identified that the proposed modification will result in 'nil' impact on the surrounding groundwater regime over the approved impacts from Stage 1.

Based on the outcomes of these studies, the cumulative impacts of the proposed modification, including the other stages of the MCP and the other mines in the area, are not predicted to impact on the health or ecology of Moolarben Creek and the Goulburn River.

## 5.8 Mitigation

### Submission – G7.13

*OEH recommends that sufficient detail regarding all proposed mitigation measures, including type, location, and justification for their selection (eg purpose and likely efficacy) be provided.*

The text supporting this recommendation is focussed on the mitigation measures for the Pine Donkey Orchid, if recorded in subsequent surveys, and the mitigation of impacts on rock outcrop habitat on cave-roosting bats. Accordingly, the response addresses these matters.

As noted in Section 5.2 of this report, in accordance with OEH's recommendation, targeted surveys for the Pine Donkey Orchid are planned for spring 2013. If detected, appropriate mitigation measures will be implemented. These may include the translocation of identified individuals in the proposed extension areas to nearby suitable habitat such as the proposed offsets. Translocation of the Pine Donkey Orchid has proven to be successful to mitigate project impacts in the region for the Mangoola Coal Project. Other measures to mitigate indirect impacts on any threatened plants, if identified in the areas surrounding the proposed extension areas in spring surveys, would include weed control and monitoring of health as part of an adaptive monitoring and management program for the project.

As noted in Section 5.7, the proposed modification will remove 3 km of rock outcrop, of which 5 m has been identified as recently providing microbat roosting sites (recorded in one outcrop structure). Similar compensatory habitat for cave-roosting microbats has been identified and assessed in the proposed biodiversity offset sites with at least 7.6 km of rock outcrops having been mapped. These areas include multiple sandstone overhangs, crevices, and caves of varying depths. However, should roosting sites not be confirmed in this potential habitat, MCO has committed to investigate use of artificial roosting sites for microbat habitat augmentation.

Artificial roosting structures would target the Eastern Cave Bat (likely to be roosting in the proposed extension areas) and the Large-eared Pied Bat (limited potential habitat exists in the proposed extension areas), however these may also benefit other local species including the Eastern Bentwing Bat. Target species have been recorded using boulder piles and fairy martin nests under drainage culverts (Churchill 2008; Schulz 1997), and are likely to use artificial habitats.

## 5.9 Biodiversity offsets

**Submissions** – *S1.11, S3.16, S4.9, S4.21, S4.25, S5.5, C9.5, C38.18, C39.29, G7.15-26*

The BOS/BOP has been prepared in accordance with OEH's Interim Policy on assessing biodiversity impacts of major projects. Section 2 of this policy clearly acknowledges that proposals assessed as state significant projects or Part 3A do not have to meet the 'improve or maintain' standard which is required under the biobanking scheme. The Biobanking Assessment Methodology (BBAM) applied to the development of the BOS/BOP was used to:

- quantify and categorise the biodiversity values impacted;
- establish the offsets required for benchmarking purposes; and
- inform the offset package.

Submissions related to biodiversity offsets are summarised in italics with a response provided below each matter.

*OEH recommends that more detailed descriptions of each offset property, including clear identification of the condition of the DNG present as well as the condition and area of the DNG included within the offset calculations is provided. Mapping and area calculations should be supplied for the following: low condition vegetation/grasslands; non-EEC listed native grasslands; derived native grasslands that correspond to an EEC (EPBC Act or TSC Act); and native vegetation in moderate-good condition. The data and assumptions used to determine these classifications should also be supplied.*

As noted in Section 5.1, the BOS/BOP has been revised and is provided in Appendix E. The revision:

- includes an additional property, the Clarke property, of 332 ha with significant areas of HU575 Narrow-leaved Ironbark shrubby open forest (a Dry Sclerophyll Forest Formation that was in deficit in the original offset package); and
- removes further areas of poor quality DNG (21.24 ha removed from Clifford property).

As a consequence of these changes, the total area of the package has:

- increased from 629 ha to 924 ha or by 47%, providing an offset ratio of 5.22:1; and
- decreased the proportion of DNG from approximately 250 of 629 ha (or 40% in original package) to 211 of 924 ha (or 23% in revised package).

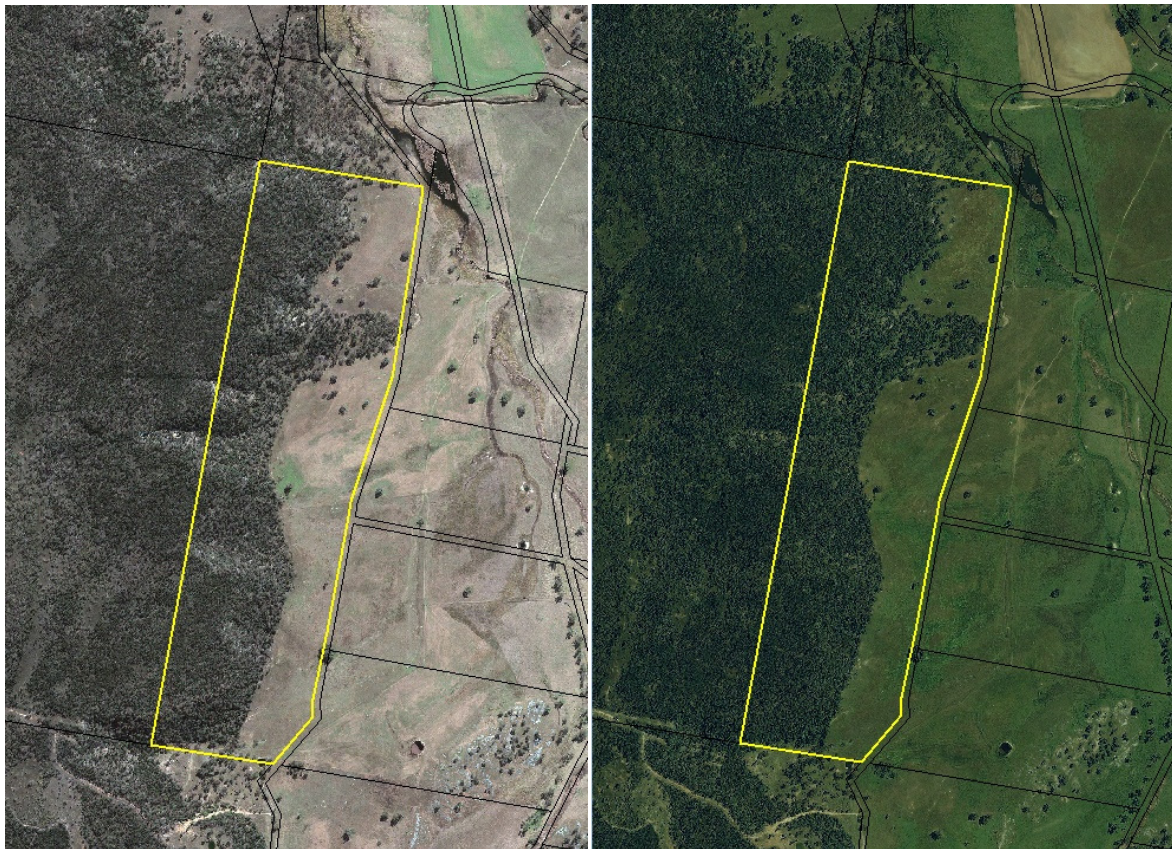
The BOS/BOP has been revised and updated to provide these new areas (see Appendix E Table 2) and combined to show the proportion of each vegetation type in a woodland, sparse woodland or DNG condition state (see Appendix E Table 3). The offset package now includes:

- 613 ha of woodland;

- 100 ha of sparse/regenerating woodland; and
- 211 ha of DNG.

All vegetation in the offsets meets the definition of biometric 'moderate to good' under the BBAM with some areas, for example 10 to 20 ha on Property #5 and Moolarmoo being of poorer quality (but still moderate-good).

The OEH submission discusses the quality of the mapped DNG on property #5 with satellite imagery from 2009 indicating the area had been pasture improved. Aerial images taken in August 2012 and March 2013 (Photograph 5.2) do not show the area as being significantly pasture improved. This was confirmed by site inspections in May 2013 which identified that while the area was heavily grazed and dominated by *Sporobolus* with *Glycine* and chenopods, exotic cover was low. Despite this, it is a relatively small part of the overall offset package (approximately 12 ha). Similarly, the northern part of Moolarmoo has been subject to pasture improvement and cultivation and is in poor condition with the DNG in this area being around 5 to 10 ha.



**Photograph 5.2** August 2012 aerial and March 2013 aerial of the property #5 poor condition DNG area

The DNG component of the offset package has been mapped as areas where the perennial ground cover was predominantly (greater than 50%) native, had 12 or more native understory species excluding grasses and at least one 'important' species consistent with DEH (2006), the BBAM and the *Native Vegetation Act 2003* definition of native vegetation.



The condition of DNG was assessed via biometric plots and/or traverses to estimate cover and compile preliminary species lists. Whilst all of the DNG areas have and continue to be grazed and parts have been subject to pasture improvement activities, the DNG areas typically include a dense cover of perennial native grasses (eg *Bothriochloa macra*, *Aristida spp*, *Austrodanthonia*, *Eragrostis spp*, *Sporobolus creber*, *Calotis spp*, *Microlaena stipoides*, *Dichanthium sericeum*, *Digitaria brownii*) and several non-grass understory species. These areas often had in excess of 20 native ground cover species.

Based on grazing history and current condition, most of the DNG areas in the offset package would meet the Box Gum Woodland (EEC) transition state 3B and 2B as defined by Rawlings *et al* (2010) with moderate to high nativeness of ground cover and infrequent fertilisation. With appropriate management, including progressive removal of grazing pressure and weed control, it is expected that these areas will naturally regenerate, as was observed at the Old Bobadeen property.

The majority of the DNG is on the Old Bobadeen property (121 ha) and Property #24/25 (38 ha). Of the 324 ha of TSC Act listed Box Gum Woodland (EEC) vegetation types (HU654, HU653 and HU551) included in the package, 157 ha or 48% is DNG. 153 ha or 58% of the Box Gum Woodland critically endangered ecological community (CEEC) listed under the EPBC Act (264 ha) occurs as DNG.

Fully attributed GIS shape files for the vegetation mapping of the proposed offset properties, together with plot data sheets will be provided to OEH as requested.

*OEH recommends that a detailed justification be provided for the inclusion of restoration of DNG in the proposed offsets, including demonstration that:*

- *all other options have been exhausted and the success of the proposed restoration considering the site conditions is supported by relevant published/peer reviewed research; and*
- *details on the land use history of any areas of DNG proposed as offsets be provided, including cultivation history, fertilizer application and groundcover species present (native and exotic), along with information relating to elevated soil nutrients (such as with nitrate, ammonium, available phosphorus and total carbon) in order to inform the suitability of the sites for inclusion in the offset and to understand the capacity of the system to respond to management.*

As indicated above, in response to OEH's concerns, MCO has pursued other options and as a result the offset package has been modified to include additional woodland and forest areas and a reduced DNG component. Areas of poorer quality Box Gum Woodland (EEC) DNG have been removed from the offset package. The remaining areas of DNG are in such condition that natural regeneration will occur under appropriate management (ie progressive removal of grazing and weed control) as is already occurring at the Old Bobadeen property. Consequently, MCO is confident that these areas can be restored to functioning woodland ecosystems within reasonable timeframes. Notwithstanding, MCO will review the previous land use history in the preparation of its revised LMP for these offset areas (including, where possible, cultivation, fertilizer application history, soil nutrient levels and ground cover species present) to inform appropriate management and performance/completion criteria for the included DNG offset areas. If monitoring indicates that these areas are not recovering as expected within the first five years of management, then MCO would investigate use of alternative management measures for these areas.

*OEH recommends that the proportion of the offset that involves protection, management and enhancement of existing remnant vegetation relative to rehabilitation/restoration works be increased, unless adequate justification for this can be supplied.*

The BOS/BOP has been revised in response to the OEH submission to remove further areas of poor quality DNG (21.24 ha removed from Clifford property) and include an additional property of 332 ha that includes significant areas of existing HU575 Narrow-leaved Ironbark shrubby open forest (a Dry Sclerophyll Forest Formation that was in deficit in the original offset package).

As a consequence of these changes, the total area of the package has increased from 629 ha to 924 ha and the proportion of DNG has reduced from 40% (approximately 250 of 629 ha in original package) to 23% (211 of 924 ha in revised package). The majority of the DNG is on the Old Bobadeen property (121 ha) and Property # 24/25 (38 ha).

The additional 286 ha of existing Dry Sclerophyll Forest habitat on the additionally proposed offset property (ie the Clarke property) increases the area of existing Dry Sclerophyll Forest habitat in the offset package to 613 ha. Preliminary fauna surveys have confirmed a range of threatened fauna species, including Brown Treecreeper, Grey-crowned Babbler, Varied Sittella, Diamond Firetail, Speckled Warbler, Powerful Owl, Glossy Black Cockatoo, Large-eared Pied Bat, Eastern False Pipistrelle, Eastern Bentwing-bat and Yellow-bellied Sheathtail-bat using these habitats. The commitment to undertake detailed inventories of the offset properties is likely to record further threatened species.

In addition, the progressive rehabilitation of the proposed extension areas with the aim of re-establishing Grassy White Box Woodlands and Broad-leaved Ironbark Forests will provide future fauna habitat.

*OEH recommends that a comprehensive justification supporting why mine rehabilitation be used to reduce the quantum of the offset required, by demonstrating that:*

- *all other options have been exhausted;*
- *the rehabilitation is not already required by another approval body (such as usual mine rehabilitation requirements). Any environmental benefit claimed must be above that already required by other obligations; and*
- *the success of the rehabilitation proposed is supported by relevant published/peer reviewed research.*

As discussed further in Section 5.3, the OEH and SEWPAC offset principles refer to an environmental assessment hierarchy, that is, to avoid, minimise and mitigate impacts, then offset or compensate for any residual impacts. The OEH offset principles further state that *'impacts must first be avoided by using prevention and mitigation measures'*.

Mine site rehabilitation is a recognised mitigation measure that is used to reduce the initial level of impact and thus reduce the amount of residual impact that requires offsetting. The *NSW OEH Interim Offset Policy on Assessing and offsetting biodiversity impacts on Part 3A, State Significant Development (SSD) and State Significant Infrastructure (SSI) projects* (OEH 2011) (the OEH Interim Offset Policy) requires the use of the BBAM to quantify impacts. The BBAM has been used for benchmarking purposes only to guide the development of the offset strategy.

The BBAM specifically includes the ability to calculate the number of credits generated by mine site rehabilitation, which is significantly less on a per hectare basis than the number of credits generated by managing/enhancing existing habitat (7-8 credits per ha generated compared to 10-12). The calculations recognise that mine rehabilitation will not achieve the same results as enhancing existing vegetation. Further, mining proponents are required to lodge bonds to the value of the rehabilitation to ensure that the rehabilitation occurs to an agreed standard. Mine site rehabilitation is audited and the bond not released until satisfactory rehabilitation has been achieved.

In line with MCO's existing commitment to return areas disturbed by mining operations to their pre-mining land use, the majority of the proposed extension areas will be progressively rehabilitated for biodiversity outcomes. Once completed, these rehabilitated areas will add to the 924 ha offset package, it is not reducing the area of offset provided. Mine rehabilitation will be undertaken in accordance with MCO's approved LMP and MOP, which include objectives, performance criteria, monitoring and reporting requirements for rehabilitation. These plans will be reviewed and updated where required following approval of the proposed modification.

*OEH recommends the supply of all credit assessments be undertaken to inform the quantum of the offset, to include:*

- *a copy of the vegetation mapping (ArcGIS shapefiles);*
- *the location of vegetation plots (ArcGIS shapefiles); and*
- *plot data including species lists and abundance rankings.*

A copy of the vegetation mapping, location of vegetation plots and plot data will be provided to OEH.

*OEH recommends further examination of the need for species credits for cave roosting bats.*

An Eastern Cave Bat roosting site has not been confirmed at the proposed extension areas. However, microbat scat was identified in one overhang and expert opinion has concluded that this roost/breeding site is most likely to be the Eastern Cave Bat, given the type of sandstone overhang.

As the record of the species was not confirmed, credits were not initially calculated in the BOS. However, calculation of species credits for this species has now occurred under the revised BOS/BOP. To obtain an offset ratio an input of 1 ha of breeding habitat was entered in to the biobanking tool to determine the offset requirements. The credit calculator indicates that each confirmed breeding site, assuming sites have equal value, requires 13 credits per ha of impact. As each hectare of breeding habitat site would generate 6 credits this is equivalent to an offset ratio of 2.16:1 or protecting two confirmed roosting/breeding sites of 'equal' value ie a similar sized roosting site (the recorded site was in a 5 m overhang) or a site supporting a similar number of individuals (noting that this information is not currently available).

Potential roosting habitat has been mapped across the proposed offset properties and investigated for signs of roosting activity. In all, 7.6 km of rock outcrop habitat has been mapped across three of the offset properties that provides suitable roosting sites although no activity has been confirmed to date. This rock outcrop habitat has been added to the biodiversity values maps in the BOS/BOP. Photograph 1.2 provides an indication of the range of suitable sites that were recorded. Cave roosting habitat features suitable for occupation by bats are a dynamic habitat feature of the landscape with sites being lost and formed over time due to weathering or other disturbances to the caves. Accordingly, these species have evolved to adapt to these changes by using more than one site and being able to use alternative sites should past sites become unsuitable. The protection of at least 7.6 km of rock outcrop habitat provides opportunities for suitable sites to develop and be occupied over time.

MCO has made a commitment to continue investigating potential roosting sites for bat activity across the Stage 1 and proposed Stage 1 modification offset areas to meet this additional offset requirement. A commitment has also been made to investigate use of artificial roosting sites should sufficient roosting habitat not be identified within the offset areas.



**Photograph 5.3 Potential cave roosting bat habitat recorded on the Elward and Moolarmoo offset properties**

*OEH recommends a summary of the quantum of ecosystem credits supplied by the offset strategy against the associated ecosystem credit fauna assemblages be included.*

A summary of each threatened fauna species predicted or recorded in the impact area and whether these same species have been recorded or are predicted to occur in the offset properties is included in the revised BOS/BOP (refer Appendix E Table 4). The offsets contain the same habitat for each of the species recorded or predicted to occur by the BBAM, with the same species predicted or have been recorded in the vegetation types mapped on the offset properties (refer Appendix E).

*OEH recommends that detailed information be presented to support any claims that the required credits are not able to be secured for all entities to meet Tier 2 of the OEH Interim Offset Policy. Satisfactory justification for proceeding to Tier 3 on the credit availability grounds should also be provided.*

The BOS/BOP has been prepared in recognition of the NSW Offsetting Principles (DECC 2008), OEH's Interim Offset Policy (OEH 2011) and the EPBC Act offset guide (SEWPaC 2012). It uses the 'maintain or improve' principles to inform the quantum of offsets required consistent with OEH's Interim Offset Policy. In the BOS/BOP, the BBAM has been used for benchmarking purposes only as a guide to determine the suitability of the proposed package.

As the project will impact on an identified endangered ecological community, a 'red flag' under the BBAM, a Tier 1 outcome, in accordance with the OEH Interim Offset Policy, cannot be achieved by the project. To meet the full credit requirements and achieve a Tier 2 outcome, 1,133 ha of vegetation and habitats on a 'like for like' basis would be required in the offset package. This would be reduced to 984 ha following successful mine rehabilitation to pre-existing vegetation communities.

Even with the addition of the further proposed offset property (Clarke property), the offset package does not reach a full Tier 2 outcome as the vegetation communities on the offset properties do not match the exact 'like for like' criteria required. However and importantly, the offset package achieves a Tier 2 outcome for the HU654 White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW, which represents the Box Gum Woodland (EEC). It also provides suitable outcomes for the other vegetation types by substituting for other vegetation types in the same vegetation formation, which results in the same habitat values for threatened fauna species that are driving the ecosystem credits.

There are no readily available biodiversity credits available to be purchased to meet the small shortfall in offset area required on a 'like for like' basis. Properties currently for sale that have the appropriate vegetation types would provide an enormous surplus area making the land purchase proposition financially unviable and unwarranted. Therefore, the variation criteria in the OEH Interim Offset Policy have been applied for those vegetation types, resulting in a Tier 3 outcome. All outstanding vegetation type requirements can be met using criteria A which allows the conversion of ecosystem credits for one vegetation type to any vegetation type within the same formation in the same IBRA bioregion.

Under the variation criteria, the minimum area standard is an offset to clearing ratio of 2:1. The proposed offset package is significantly larger than the minimum 2:1 ratio required for a Tier 3 offset and provides an offset ratio of 5.22:1. The package predominantly consists of enhancing and managing existing vegetation (714 of 924 ha or 77.3%) and provides matching threatened fauna habitat. Given the size and targeted nature of the offset package, and the commitment to protect and manage the offset areas in perpetuity, the overall Tier 3 mitigated loss outcome is considered more than adequate to compensate for the impacts of the proposed modification.

*OEH recommends that a strong case to be provided for any requested reduction in the required credits on economic grounds. At a minimum, this should include:*

- *review of costings for offset purchase and management by a suitably qualified and experienced person;*
- *documentation of current land valuation in offsetting area from the Department of Finance and Services, Land and Property Information;*
- *a cost benefit analysis for the project which includes the estimated offsetting costs associated with the provision of the full quantum of required credits and taking into account any offset lands which were not purchased exclusively for the purpose of providing an offset (ie land which required acquisition for other reasons, such as noise etc, regardless of the offset requirements); and*
- *consideration of the predicted level of impact on high conservation value vegetation communities threatened species and their habitats.*

To obtain the required 984 ha of 'like for like' vegetation types to meet a Tier 2 outcome, large offset areas would need to be purchased to cover the variety of vegetation types and habitat values in the proposed extension area in sufficient quantities. There are no readily available biodiversity credits available to be purchased to meet the small shortfall in offset area required on a 'like for like' basis.

Properties currently for sale that have the appropriate vegetation types would provide an enormous surplus area making the land purchase proposition financially unviable.

As indicated above, the offset package is significantly larger than the minimum 2:1 ratio required for a Tier 3 offset. The package predominantly consists of enhancing and managing existing vegetation (714 of 924 ha or 77.3%) and provides matching threatened fauna habitat. Given the size and targeted nature of the offset package, and the commitment to protect and manage the offset areas in perpetuity, the overall Tier 3 mitigated loss outcome is considered more than adequate to compensate for the impacts of the proposal.

*OEH recommends that for any vegetation communities and threatened species habitat for which proceeding to Tier 3 is justified, development of the final offset strategy should include systematic application of the Tier 3 criteria in consultation with OEH.*

Consultation and discussion has taken place with OEH regarding the systematic application of the Tier 3 criteria on the basis that a strict Tier 2 outcome cannot be achieved on 'like for like' vegetation types. The offset package proposed is almost equivalent to a Tier 2 outcome in area (924 ha compared to 984 ha), and has been met within the local area with the first Tier 3 variation criteria (criteria A) by matching vegetation types at the formation level with equivalent fauna assemblages.

*OEH recommends that an assessment of all external factors (eg existing access arrangements for other parties, potential future infrastructure proposals and connectivity with other lands managed for conservation) be undertaken, which may impinge on the value of proposed offsets, the ability of the subject properties to provide the proposed offsets, and/or present management difficulties.*

Existing access arrangements for third parties (including existing public access roads and access arrangements for the Ulan mine) will be maintained and are not included in the offset calculations.

MCO is unaware of any future third party infrastructure proposals on the proposed offset properties that would prevent them being managed to achieve the conservation objectives of the BOS/BOP. Notwithstanding, proponent's for any such future infrastructure proposals would need to independently consider their offset liabilities.

*OEH recommends that the ability to provide an offset strategy which is appropriately located, designed, and can be secured via a method which meets the OEH Offset Principles and the requirements of the OEH Interim Offset Policy should be demonstrated.*

The proposed offset package is appropriately located, can be secured via an appropriate conservation mechanism and meets the OEH Offset principles consistent with the OEH Interim Offset Policy.

*One respondent considers that the proposed biodiversity offset package will not replace the loss of mature features such as tree hollows and mixed aged vegetation, or the destruction of intact CEEC when considered with the currently approved vegetation removal from the regional landscape. Another stated that the proposed modification would result in a negative impact on biodiversity conservation. Reference was also given to the adequacy of existing offsets for previously approved activities.*

The BOS/BOP has been targeted to offset the impacts of the proposed modification. It has been prepared in accordance with the NSW Offset Principles, OEH Interim Offset Policy and EPBC Act offset guide.

*The description of the size of the reserves in relation to the additional area identified for removal is not relevant. A comparison of the cumulative loss of significant and limiting habitat features such as hollow bearing trees and rocky outcrops in the region would be a more robust indication of cumulative impact on threatened species.*

This matter has been addressed in the Section 5.7 of this report.

*The Central West Environment Council seeks clarification to the proposed offset of the White Box Yellow Box Blakely's Red Gum Woodland, which is considered to be inconsistently applied when compared to ratios for clearing of agricultural land.*

The offsets for this project have been proposed in accordance with the applicable legislative, regulatory and policy framework applied by the state and federal governments for Major Project assessment.

*One submission includes a statement that adequate offsets are good in theory, but in practice need careful consideration and are not for mining companies to keep in reserve to mine later.*

The BOS/BOP has been developed with careful consideration for future coal resource development opportunities and a commitment has been made to register an appropriate, legally binding conservation covenant to provide protection of the proposed areas in perpetuity.

In preparing the proposed offset strategy, MCO has sought to build on its existing Stage 1 offsets to create larger protected areas of connected habitat across the surrounding landscape.

## 5.10 Other matters

**Submissions** – S4.20, S4.24, C34.2, C39.21, G6.1, G7.5

*One submission referenced expanded threats to flora and fauna in the eco-retreat, Stone Cottages, where drilling is proposed.*

The proposed mine extension areas are located at least 6 km to the south of the Stone Cottages enterprise and no drilling associated with the proposed modification will occur on land within the proximity of the Stone Cottages. Therefore, the proposed modification will not cause the claimed flora and fauna threats.

*One submission contends that the proposed modification is in contravention to the principles of the EPBC approval for Moolarben Stage 1.*

The proposed modification is beyond the scope of the Stage 1 Commonwealth approval – EPBC 2007/3297. Accordingly, a referral of proposed action under the EPBC Act has been submitted to the Department of Sustainability, Environment, Water, Population and Communities for its consideration.

*The OEH submission seeks clarification regarding the assessment of impacts on Groundwater Dependent Ecosystems (GDEs). OEH seeks clarification of whether there are other GDEs which may be impacted via the cumulative impact of mining operations in the area. Another submission seeks further information on potential impacts on GDEs associated with the alluvial flats of the Moolarben Valley.*

As considered in Section 10.3 of the EA, the occurrence of GDEs was assessed in accordance with relevant NSW policy and there are no high priority GDEs identified within the Water Sharing Plan that applies to the area. The Drip is a locally recognised important cliff seepage feature located on the north of the Goulburn River about 6 km north of the proposed extension areas and represents the only significant seep/spring within the local area (outside of existing conservation reserves) with groundwater dependent vegetation. The proposed modification will not cause an impact on this feature. While it is noted that scattered individuals of River Red Gums have been recorded along Moolarben Creek approximately 500 m west of the proposed Open Cut 2 extension area, the proposed modification will not impact on this area.

Previous studies undertaken for the Stage 1 EA by Moolarben Biota (2006a) concluded that there would be no direct or indirect impact on GDEs associated with the mining of Open Cuts 1 and 2.

The surface water study (EA Appendix I) and the groundwater study (Appendix J) for the proposed modification included cumulative assessments of the proposed modification combined with the other stages (approved and proposed) of the MCP and the Wilpinjong and Ulan Coal Mines. The studies concluded that there would be negligible change in flows to surface water features including Moolarben Creek, no change to The Drip and 'nil' impact on the surrounding groundwater regime approved for Stage 1.

Therefore, there will be no impact on the River Red Gums along Moolarben Creek or vegetation supported by The Drip. As there are no other identified GDEs within or in the relative vicinity of the proposed extension areas, the proposed modification will not impact on GDEs.

*Submissions contend that the ongoing loss of good quality habitat around the edges of the Munghorn Gap Nature Reserve and Goulburn River National Park will increase the pressure on existing populations and competition for threatened species habitat within the reserves, which is not addressed.*

As described in Section 6.1.3 iv of the ecological study, there may be some impact to surrounding conservation reserves during gradual clearing of the proposed extension areas. Fauna may migrate from the proposed extension areas into surrounding conservation reserves, which may lead to competition for territory and habitat resources with resident fauna. Mitigation measures including progressive rehabilitation of disturbed areas and re-use of habitat features (ie hollow logs, rocks) in mine rehabilitation areas will be implemented to minimise the likelihood of resource competition in surrounding conservation reserves.

*NSW Fisheries advocates the use of terrestrial riparian buffer zones as per the policy and guidelines for 'Fish Habitat Conservation and Management Update 2013', and requests that adequate riparian buffer zones be established, particularly with regards the proposed extension of Open Cut 2 and proximity to Moolarben Creek.*

As discussed in Section 5.3 the mine plan was optimised to ensure the exclusion of Moolarben Creek, its floodplain and the riparian zone and associated habitats. The LMP will be updated to include the proposed extension areas. The LMP will consider the use of terrestrial riparian buffers, in accordance with the relevant policy and guidelines, to the satisfaction of the DP&I and other government agencies (NSW Fisheries) as required.



## 6 Acoustics

### 6.1 Assessment approach

**Submissions** – S1.3, S3.8, S4.28, S5.2, C19.12, C36.1, C36.2, C38.14, G8.1

Several submissions raise matters in relation to the approach to the noise and vibration study (EMM 2013b) (EA Appendix C).

*Specific matters raised by the community, regarding the approach to the noise and vibration study, comprise:*

- *predictions of the impacts of the current operations were vastly understated and, therefore, the modelling used to predict the limited impacts of the proposed modification is questioned;*
- *potential impacts from the removal of a section of ridgeline and changes in topography on residents at Cook's Gap, Ridge Road and receiver 32 (end of Moolarben Road) are substantially understated; and*
- *receiver 32 was excluded from the assessment.*

Qualified and experienced acoustic consultants prepared the noise and vibration study for the proposed modification, in accordance with relevant guidance and criteria required by the EPA and DP&I. This included comprehensive modelling and assessment of a range of operating scenarios using conservative worst case assumptions and monitoring results for existing operations.

Based on the outcomes of the initial environmental risk assessment undertaken for the proposed modification, the noise and vibration study was peer reviewed by Dr Rob Bullen, Director of Wilkinson Murray and a qualified and experienced acoustic expert. All peer review comments were addressed in the noise and vibration study for the proposed modification. A copy of the peer review letter is attached to the noise and vibration study.

Quantitative modelling of operating noise used proprietary noise modelling software Predictor. The selected software algorithms are recognised by environmental authorities and acoustic consultants as being one of the most reliable predictive methodologies currently available. The three dimensional model included surrounding topography, mine plans, sound power levels from plant and machinery consistent with the Stage 2 preferred project report (PPR) noise study (Global Acoustics 2012) and effects of prevailing weather conditions. Potential impacts were modelled and assessed for representative stages of the proposed modification.

The modelling used representative mine plans for the life of the proposed modification and located plant and equipment at worst case operating positions. The use of staged mine plans (shown in Appendix C of the noise and vibration study and augmented with the additional operating scenario described in Appendix G to this report) allows the change in topography, which includes the modification of the ridgelines at various stages of the proposed modification, to be considered in the predicted operational noise levels.

Modelling predicts that operational noise levels will be below the existing approved noise impact assessment criteria for Stage 1 (as prescribed in MP 05\_0117) during all periods (day, evening and night) and worst case meteorological conditions, for each mine stage for all but six privately-owned residences in the Cook's Gap and Ridge Road area. The assessment locations with predicted noise levels above the approved Stage 1 noise limits comprise residences 30 and 31, which are isolated properties located off Moolarben Road and residences 58, 63, 70 and 75, located near the intersection of Ulan Road and Ridge Road. With the exception of property 30, the predicted worst case noise levels at these residences is 1 to 2 dB(A) above the existing approved noise limits, which is considered minor (ie an audibly indiscernible increase). The predicted worst case noise level at property 30 is 4 dB(A) above the existing approved noise limit for this residence, which is classified as a moderate increase, although this is not predicted to occur until year 21 of the indicative mine plan (refer to Table 6.1 below).

Modelling also predicts that one private rural landholder (property 32) will experience noise levels of greater than 40 dB(A) on more than 25% of the total property land area. In addition, six individual lots comprising the greater landholding of two further privately owned properties (property 30 and 37) are also predicted to experience noise levels of greater than 40 dB(A) on more than 25% of the individual lot land area (see Table 3 in Appendix G).

Given the conservative nature of the noise model, and the relatively small number of residences where noise levels above noise limits have been predicted, it is considered that potential adverse noise impacts for the majority of residences at Cook's Gap and Ridge Road are unlikely.

Assessment location 32 was included in the noise and vibration study and operating noise levels from the proposed modification were demonstrated to be well below the existing approved noise impact criteria (ie 35 dB(A)) for this residence during all years and all assessed meteorological conditions. This assessment location is shown at the southern extent of Figure 8.1 in the EA. However, while the existing approved noise impact assessment criteria (i.e. 35 dB(A)) will not be exceeded at this residence, more than 25% of the land area of this property is expected to experience noise levels above 40 dB(A) which would provide this property owner with voluntary acquisition rights.

It is also noted that, although the mining areas of Open Cut 3 will not change under the proposed modification, two operating scenarios for Open Cut 3 operations (Years 21 and 24) together with proposed Stage 2 operations have been remodelled (refer Appendix C of the noise and vibration study and Appendix G to this report).

*Xstrata notes that a noise model validation has not been completed as part of the noise study. Xstrata has received specialist noise advice that validation of the noise model would provide increased confidence in the EA's noise predictions, which not suitably managed have the potential to have a cumulative impact upon Ulan Coal Mine's approved operations. Xstrata requests that validation modelling be carried out to compare the proposed modification noise model prediction with the measured values and with predictions made for the Stage 2 PPR.*

The Stage 2 PPR noise study included a site specific noise model validation process through attended monitoring that found a minus 3 dB(A) correction was applicable to all weather enhanced noise predictions. The noise and vibration study for the proposed modification used the same plant and equipment sound power levels and the same noise modelling algorithm as the Stage 2 PPR noise study. Notwithstanding, this model correction factor was not included in the assessment of the proposed modification. Noise level predictions are considered to be conservative with no justification to re-validate the noise model for the proposed modification. This was discussed with the EPA through the consultation process. Furthermore, based on experience at other mine sites where validation exercises have been conducted, all software predictions in those cases have been conservative, particularly for adverse weather conditions.

As mentioned previously, the noise and vibration study, including the approach to modelling, was peer reviewed.

*The EPA notes that, in light of the recent Bulga-Warkworth appeal, and as the proposed modification indicates that the project specific noise levels (PSNL) will be exceeded at six residences, it requires MCO undertake the evaluation required by Section 8.2.1 of the INP.*

Section 8.2 in the INP states that:

*'The section below [Section 8.2.1] outlines a checklist that can be used as a guide by EPA officers to determine an acceptable level of residual noise impacts when setting statutory noise conditions, based on the consideration of social and economic benefits.'*

Residual noise impacts are described in the INP as predicted noise levels above the PSNLs. The noise and vibration study identified noise levels over the PSNLs (or residual noise impacts) at six assessment locations as summarised in the table below (see Table 8.2 of the EA and Appendix G to this report).

**Table 6.1 Assessment locations with predicted noise levels above PSNLs**

ID	Level above MP05_0117 (ie PSNL)	Year
30	moderate exceedance, up to 4 dB	21, 24
31	minor exceedance, up to 1 dB	21
58	minor exceedance, 1-2 dB	6, 11, 16, 21
63	minor exceedance, 1-2 dB	6, 11
70	minor exceedance, 1-2 dB	6, 11, 16, 21
75	minor exceedance, up to 1 dB	11

It is noted that MCO is not seeking to increase the existing approved noise impact assessment criteria for the mine at any privately-owned property and will manage its noise emissions in accordance with the conditions of the existing Stage 1 approval.

Nonetheless, an evaluation of the proposed modification against Section 8.2.1 of the INP based on residual noise impacts is provided below.

*1. Characteristics of the area and receivers likely to be affected*

The majority of the local area surrounding the MCP is characterised by mining areas and associated infrastructure and agricultural land, mainly pasture, with moderate sized stands of native woodland retained along the steeper hillsides and ridgelines and in patches along creek lines.

MCO owns a substantial area of land surrounding the project area. The Ulan settlement north-west of the MCP includes a primary school, a church, a hotel, mine-owned residential dwellings and vacant and Crown-owned land. A rural residential development known as Cook's Gap, with a residential population of approximately 490 residents, is located about 4 km to the south-west of the MCP. A relatively small number of farms and scattered homesteads occupy the rest of the surrounding freehold land.

Coal mining in the area has been ongoing since the early 1900s. The Ulan Coal Mine, which is adjacent to the north-west of the MCP, was commissioned in the 1980s. The Wilpinjong Coal Mine, to the east of the MCP, was commissioned in 2007.

There is a relatively small number of receivers (only six assessment locations, see Table 6.1) where noise emissions for the mine are predicted to exceed the approved PSNLs. The assessment locations equate to approximately 4.8% of the total considered (126) in the assessment. Furthermore, five of these assessment locations (31, 58, 63, 70 and 75) are only expected to receive minor noise level exceedances (1 to 2 dB(A)). One of these assessment locations (30) is expected to receive a moderate noise level exceedance (up to 4 dB(A)). It is noted that this location was identified in the Stage 1 assessment as also having noise levels up to 2 dB(A) above PSNLs.

No privately owned assessment locations will receive noise levels that potentially place them in a noise acquisition zone.

## 2. *Characteristics of the proposal and its noise or vibrations*

The proposal is to extend current approved Open Cut 1 and 2 boundaries to access additional resources and increase mining efficiency. The extension areas will be located further from the majority of assessment locations to the west of the mine and to the north in Ulan settlement. Generally, the assessment found that mining in the proposed extension areas will generate similar noise levels to the current approved Stage 1 operations.

The noise and vibration study predicted that during adverse weather conditions for all assessment periods and all stages of the mine life with all reasonable and feasible mitigation included, the majority of assessment locations will experience noise levels below approved Stage 1 noise impact assessment criteria.

As indicated above the assessment also found that one private rural landholder (ID 32) is predicted to experience noise levels of greater than 40 dB(A) on more than 25% of the total property land area. In addition, within two privately owned properties, six individual lots comprising the greater landholding listed in Table 6.4 of the noise and vibration study (EA Appendix C), are predicted to experience noise levels of greater than 40 dB(A), on more than 25% of the individual lot land area.

The assessment found that no private rural landholders are predicted to experience noise levels of greater than 40 dB(A), on more than 25% of their total land area. However, within two privately owned properties, six individual lots comprising the greater landholding listed in Table 6.4 of the noise and vibration study (EA Appendix C), are predicted to experience noise levels of greater than 40 dB(A), on more than 25% of the individual lot land area.

It is also important to note that noise levels at Ulan Public School are predicted below the 35 dB(A) internal noise limit during calm and adverse meteorological conditions.

All other noise and blasting criteria relevant to the proposed modification are predicted to be met. Furthermore, the overall characteristics of the noise and vibration from the proposed modification are considered similar to previously predicted and approved noise and vibration emissions.

It is also noted that assessment location 63 is currently listed in the additional noise mitigation section of the Stage 1 approval (Condition 8), and the owners of the property have entered into a noise agreement with MCO, that will take effect subject to the positive determination of the Stage 2 proposal.

### 3. *Feasibility of additional mitigation or management measures*

Noise management and monitoring at the MCP is carried out in accordance with MCO's Noise Management Plan (NMP) which was prepared in consultation with the EPA and approved by DP&I. The NMP requires the implementation of the following operational and engineering controls which were included in the noise model where relevant and will continue under the proposed modification:

- separate day and night emplacement areas when deemed necessary at night;
- operating in shielded areas during adverse weather conditions;
- use of real-time noise monitoring data to assist operational personnel in proactive management of noise impacts;
- regular maintenance of equipment, including sound attenuation components;
- sound power testing of mobile and stationary equipment;
- enclosure of high risk stationary equipment at the CHPP such as conveyors, crushers and reject bins;
- attenuation of mobile equipment such as haul trucks, shovels and excavators, dozers and drills;
- commitment to maintain an awareness of best practice noise mitigation technologies and alternative operating methodologies; and
- continued community consultation to help identify and manage operational noise impacts in the surrounding district.

Although not required under existing approvals, of particular note is MCO's initiative of employing dedicated production assistants to monitor and support real time noise mitigation strategies. The assistants observe operational environmental impacts (including noise) in the community 24 hours a day. While operating in the community the production assistants have the ability to relay live noise and observational data back to operational staff at the mine that can then make informed decisions on what management strategies are necessary to reduce operational noise and other mine related impacts on the local community.

MCO has also committed substantial investment to the research and development of Duratray which has been fitted to several of the operating rear dump trucks. Duratray is an impact resistant rubber tray lining which has been proven to significantly reduce noise associated with loading.

As demonstrated above, MCO employ a range of mitigation and management measures, some of which are industry leading innovation, such as the introduction of the first Duratray fitted trucks to mining in NSW for noise management. The noise and vibration study incorporated the above noise mitigation and management strategies in the assessment method. No further reasonable and feasible mitigation was identified.

### 4. *Equity issues*

The proposed modification will not result in any direct increase in the region's population. Potential noise impacts from the proposed modification will be managed by MCO to acceptable levels and are therefore not predicted to result in potential acquisition of private residences. As such, the potential for adverse

social impacts is considered low. However, the proposed modification will enable MCO to continue to support the local community as a local employer, economic contributor and community partner.

Matters related to equity are discussed further in Chapter 22 of the EA.

It is considered that the residual impacts from noise are minor when compared to the social and economic benefits that will be realised under the proposed modification. MCO is also committed to managing noise impacts at the six properties identified to have potential noise levels above the approved Stage 1 noise limits. Furthermore, given the conservative nature of the assessment, it is likely actual operating noise levels would be less than those predicted, for the majority of the time.

Notwithstanding the above, it is anticipated regulatory authorities would also provide an evaluation of the proposed modification based on guidance provided in Section 8.2.1 of the INP.

## 6.2 Increased noise impacts

**Submissions** – S4.28, C5.5, C10.9, C15.4, C16.6, C17.5, C18.3, C19.5, C21.3, C26.3, C28.2, C28.6, C29.3, C32.6, C36.6, C37.5, C38.16, C39.7, C40.1

*A number of submissions raise potential increases in noise from the extension of mining impacting residents, including due to a reliance on extensive coal truck haulage roads.*

As noted in Section 8.3.1 of the EA, an initial risk assessment undertaken during the scope development for the proposed modification identified noise as a potential high risk issue requiring detailed assessment. Noise was recognised as an important issue during the government's assessment of Stage 1 and was considered in detail by the IHAP prior to the determination of Stage 1. Accordingly, EMM worked together with MCO mine planning engineers to develop a mine plan that achieved its production objectives whilst minimising the potential for noise impacts. This process involved a detailed review of the past noise studies (including the Stage 1 IHAP report), mine plans and plant and equipment operating schedules for each assessed stage of mining, in consultation with MCO mine planning engineers.

Noise modelling of the preliminary mine plans was undertaken to assess the magnitude of potential noise impacts from the optimised mine design. This process demonstrated that an increase in current operating noise levels as a result of the proposed modification was unlikely, and on this basis, the indicative mine plan was finalised and formed the basis for the detailed noise and vibration study contained in the EA.

The modelling of the finalised mine plan included all haul roads as represented in the five staged mine plans (refer Appendix C of the noise and vibration study) and noise levels provided in the report are representative of the already approved coal truck haulage operation. It should be noted the haul road length does not change from the approved Stage 1 operations, apart from the minor changes required to reach the proposed Open Cut 1 and 2 extensions areas.

Overall the preliminary and final noise modelling process found that the extension of Open Cuts 1 and 2 would generate noise levels generally similar to the approved Stage 1 operations. Therefore, an increase in noise impacts on residents from the proposed modification including coal truck haulage is considered unlikely.

## 6.3 Cumulative impacts

### Submissions – S3.9, G8.2, G8.3

*The EPA seeks clarification as to how the cumulative noise levels were determined and whether (if approved) the cumulative noise levels predicted for Stage 2 will alter if Stage 1 is operated as per the proposed modification, which proposes all mining activities to be undertaken 24 hours, seven days a week.*

*The EPA notes that an undertaking was made by MCO, in relation to Stage 2, to restrict coal extraction and haulage operations in Open Cut 2 and Open Cut 3 to the day time period, with overburden stripping activities to be conducted during evening and night periods to reduce noise impacts on residences located in the direction of the prevailing meteorological conditions (east-north-east winds). The EPA notes that such an undertaking has not been made for the proposed modification and is concerned that when prevailing meteorological conditions occur, noise levels above those predicted may occur from operations in the proposed Open Cut 1 extension area in the years 6-11 when the environmental bund is not in place. The EPA requests a further justification as to why a similar restriction has not been recommended for the proposed modification.*

Cumulative noise levels were calculated by combining predicted operational noise levels from Stage 1 (including the proposed modification) and the proposed Stage 2 and surrounding mining operations comprising Wilpinjong and Ulan Coal Mines using information in publically available noise impact studies (refer to Section 8.3.3 of the EA).

To enable a conservative assessment of potential worst case impacts, the noise and vibration study assumed that Stage 2 would be approved and, therefore, included the proposed Stage 2 operations in the noise modelling (including the cumulative noise assessment). To accommodate the additional mining areas in Open Cuts 1 and 2, the mine plans and plant and equipment locations assessed (refer Appendix C in the noise and vibration study) for Stage 1 (including proposed extension areas) and Stage 2 components were different to that assessed in the Stage 2 assessment, which is one reason for the change in predicted noise levels. Of note, this included a re-design of the mine plan for the proposed modification, placing exposed segments of the coal haulage route behind overburden emplacement areas. The re-design for the proposed modification was driven by the restriction of coaling activities identified in the Stage 2 assessment.

The noise and vibration study for the proposed modification included a detailed analysis of yearly meteorological data to determine the presence of prevailing weather conditions as required by the INP. The outcomes of the analysis identified prevailing source to receiver winds to occur during the day, evening and night (including from the east-north-east direction). It would therefore not be a clear advantage to restrict coal extraction and haulage operations in Open Cuts 2 and 3 to the day time period, with overburden stripping activities occurring during the evening and night, as proposed in the Stage 2 EA.

It is also noted that, the noise and vibration study for the proposed modification, considered only one excavator operating in Open Cuts 1, 2 and 3 in all assessed mine stages with the exception of Year 1 (as indicated in Appendix C of the noise and vibration study). However, there is no limitation to whether the excavator is removing overburden or coal during the day or night, which again is due to the presence of source to receiver prevailing winds during both day and night periods and the re-design of the coal haulage route behind waste emplacement areas.

The environmental bund shown in Figure 4.1 and 4.2 of the EA (indicative Year 2 and 6 mine plan) currently exists at the MCP. MCO propose to extend the environmental bund adjacent to the haul road which will be constructed as mining progresses through Open Cuts 2 and 3 as shown in indicative Year 11, 16 and 21 mine plans (refer Figure 4.3 to 4.5 of the EA). The construction of the bund in years 6 to 11 therefore has no bearing on Open Cut 1 activities as the primary function is to reduce haul road noise emissions as mining progresses south. To reiterate, the noise levels presented in the noise and vibration study are representative of the indicative staged mine plans (including existing and proposed environmental bunds) and plant and equipment locations as provided in Appendix C of the noise and vibration study and Appendix G of this report.

Previous studies prepared for the Stage 2 PPR identify potential property acquisition as a result of noise affectation from the concurrent operation of open cut mining in Stage 1 and Stage 2. The noise assessment for the proposed MOD9 application includes an assessment of combined Stage 1 and Stage 2 operations and hence supersedes the previous Stage 2 noise assessment. The MOD9 assessment indicates the concurrent operation of open cut mining in Stage 1 and Stage 2 will result in less noise impacts than that previously predicted in the Stage 2 noise impact assessment. The key reasons for the differences between the two noise impact assessments include:

- Stage 1 mining has progressed ahead of when the Stage 2 model assumed Open Cut 4 operations would commence. The MOD9 application will also create more overburden. This will result in further bunding being created earlier in the project life, thereby further mitigating Stage 2 PPR modelled noise impacts.
- The haul road is in-cut in the MOD9 noise model (behind overburden and within the pits) whereas the Stage 2 PPR modelling positioned the Stage 1 haul road in a more exposed location. The revised design of the environmental bund and in-cutting of the primary haulage route under MOD9 has increased the shielding benefits provided to the Stage 1 haul road. This materially reduces the property affectation reported in the Stage 2 application.
- The plant and equipment quantities and placements in Open Cuts 1, 2, 3 and 4 in each indicative mine plan differ between both assessments due to a change in mine sequencing to accommodate the additional Stage 1 extension mining areas.
- The difference in identified prevailing weather conditions. The Stage 2 PPR study adopted a default 3m/s wind for prevailing wind conditions. The MOD9 study adopted a larger range of prevailing wind directions, however, at a lesser wind speed which is representative of the upper 10<sup>th</sup> percentile wind speed which ranges between 1.5m/s to 2.7m/s. For the direction of the majority of the receivers from the mine, the wind speed adopted in MOD9 is 2.7m/s.
- Moolarben has purchased additional properties since the Stage 2 modelling was undertaken.

It is anticipated that if Stage 2 is approved, the management and mitigation commitments outlined in the Stage 2 PPR report will be reflected in the Stage 2 project approval. However, until such time, the proposed modification will not change the operating conditions of the Stage 1 approval, including hours of operation.



## 6.4 Blasting impacts

### Submissions – C1.5, C36.3

*The two submissions above relate to blasting. One questions whether blasting compliance was monitored and policed, and the other notes that blasting from the proposed modification would increase vibration and overpressure impacts.*

Blasting vibration and overpressure is currently monitored by MCO in accordance with its blasting management plan (BMP) which was prepared in consultation with the EPA and approved by DP&I. Blast predictions to surrounding sensitive receivers are performed before each blast. If the predictions demonstrate blast vibration or overpressure levels will be above the approved Stage 1 (MP 05\_0117 and EPL 12932) limits, then the blast design is refined to ensure blast vibration and overpressure will be below the approved limits. As identified in the noise and vibration study for the proposed modification (EA Appendix C), the areas where blasting will occur due to the extension of mining are at similar distances to surrounding assessment locations, as current approved operations. Therefore, blasting vibration and overpressure impacts are expected to be similar.

MCO will continue to manage and monitor blasting as required by the BMP, including its commitment to maintain compliance with conditions of approval, EPL and legislation relating to airblast (overpressure) and ground vibration. Monitoring results will continue to be publically available on the MCO website and will be included in statutory reports provided to the regulators.

## 6.5 Other matters

### Submissions – S5.2, G1.3

*One submission contends that there will be increased stress to residents of the Ridge Road and Cook's Gap area due to noise impacts which are hard to quantify. The respondent suggests the use of overburden and tree planting is inadequate.*

The noise and vibration study for the proposed modification has been undertaken in accordance with the NSW INP. The NSW INP establishes the process for the setting of noise impact assessment criteria for POEO Act scheduled activities so that the community is protected from excessive intrusive noise and the amenity for specific land uses is preserved. Mining for coal is a scheduled activity under the POEO Act and the application of the INP is directly relevant to the assessment and determination of noise impact assessment criteria for the MCP.

The aim of the INP is to 'allow the need for industrial activity to be balanced with the desire for quiet in the community'. Furthermore, one of the underlying principles of the INP is to protect 90% of the community in the vicinity of industrial activity for 90% of the time. Therefore, by controlling operational noise levels to within INP criteria, industrial noise impacts are minimised, which is the case for the majority of receivers on Ridge Road and the Cook's Gap area. MCO has committed to monitor and manage its noise emissions in accordance with its existing approval to ensure the potential for increased noise levels above the prescribed noise impact assessment criteria are minimised.

For the purpose of this response it is assumed that the 'overburden and tree planting' comment in the submission is referring to the environmental bund which was designed to minimise noise impacts. The environmental bund was shown to effectively reduce operational noise levels in the noise modelling (refer to Section 6.3).

*MWRC has ongoing concerns regarding potential noise impacts in the Ridge Road, Winchester Crescent and Cook's Gap area. MWRC considers it essential that adequate and fair acquisition measures are included within conditions of approvals should the noise affectation exceed the predictive modelling outlined in the EA.*

The Stage 1 approval includes conditions that provide mitigation and acquisition rights to properties where noise (and dust) emission levels from the mine exceed the relevant prescribed impact assessment criteria. Similar conditions are applied to all NSW coal mining projects and ensure adequate and fair mitigation and acquisition measures are available to private residences where approved mining impacts are exceeded. MCO does not expect these conditions to be altered if the proposed modification is approved.

It is noted that the existing approved noise (and dust) acquisition criteria will not be exceeded at any privately owned residence as a result of the proposed modification.

## 7 Air quality and greenhouse gas

### 7.1 Air quality

#### 7.1.1 Assessment approach

**Submissions** – S3.10, S4.29, S5.3, C19.12, C38.14

*The above submissions contend that dust impacts are difficult to quantify and have been understated. One submission comments that existing dust levels exceed previous Stage 1 modelling predictions and, therefore, questions the validity of the modelling used to predict the impacts of the proposed modification.*

MCO maintains an extensive air quality monitoring network consisting of two High Volume Air Samplers (HVAS), three Tapered Element Oscillating Microbalance (TEOM) and nine dust deposition gauges. The monitoring data collected from this network was reviewed for the assessment of potential impacts from the proposed modification. Monitoring data collected from the nearby Ulan Coal Mine air quality monitoring network from two HVAS, one TEOM and eight dust gauges were also reviewed for the assessment.

As reported in the air quality impact assessment (AQIA) (TAS 2013) (EA Appendix D) for the proposed modification, the ambient air quality monitoring results have shown that no exceedances of any air quality criteria have been recorded since the commencement of operations at the mine, and that dust levels predicted under the proposed modification will also remain below the approved dust emission criteria for the mine.

The measured data indicates that relative to the EPA (OEH) air quality index, the current air quality is generally very good or good in the vicinity of the monitoring locations, which are located near to the most potentially impacted residences. The predicted results of the previous Stage 1 assessment are generally conservative (ie overestimate likely impacts), which is supported by the monitoring results reported in the MCP annual environmental management report (AEMR). The AEMR shows that measured dust levels are generally lower than the predicted levels.

It is noted that the AQIA for the proposed modification shows the effects of both Stage 1 and Stage 2 combined, and so it would be expected that the predicted dust emissions may be higher than that predicted previously for Stage 1 alone.

It is also noted that due to the application of advanced modelling approaches in the AQIA, there are noticeable differences in the methodology used to predict impacts between the previous Stage 1 assessment and the AQIA. Previously, simple Gaussian air dispersion modelling based on the ISC model was used. The ISC model assumes a completely uniform wind field across the entire modelling domain. The AQIA applies the CALPUFF air dispersion model which considers the three dimensionally varying interactions of the prevailing winds upon the local terrain as it affects the dispersion of dust for each hour of a complete year.

The modelling approach used for the proposed modification better represents winds blowing along valleys and also winds that are blocked by terrain. This means that relative to previous air quality modelling results, the AQIA for the proposed modification may predict some higher impact along valleys due to valley drainage flows and wind channelling effects, but also some lower impacts in areas behind shielding terrain. The approach used represents the most up to date, and accurate method for modelling potential dust effects. The approach was previously developed through a process which included validation made by comparing the modelled results of known, recent mining activity with the actual measured dust levels at several locations in the Upper Hunter Valley. The validation shows excellent correlation between modelled dust levels and measured dust levels for each hour over a full year, and that the modelled results are higher than the maximum measured levels, providing an appropriately conservative basis for the assessment of potential impacts.

Under the proposed modification, air quality management will continue to be undertaken in accordance with MCO's Air Quality Management Plan (AQMP) which incorporates best practice for the control of dust emissions from coal mines. Air quality monitoring will continue and compliance of the measured levels with the approved Stage 1 criteria and predicted levels will continue to be reported in the AEMR, which is publicly available and is submitted to government for review and response. Air quality monitoring results will also continue to be reported monthly on MCO's website and will be provided in statutory reports provided to the regulators.

*Xstrata notes in its submission that it is difficult to assess air quality impacts of the proposed modification in isolation, as the emission estimation and dispersion modelling includes both the approved Stage 1 and proposed Stage 2 operations. As such, the specific air quality contributions of the proposed modification to the approved MCP operation along with any associated potential cumulative impact are not certain. Xstrata notes a significant number of receptors to the west of the MCP operations that were assessed in Ulan Continued Operations (EA) 2009 but not for the proposed modification. The MCO contour plots, particularly 24-hour average PM<sub>10</sub> concentrations from the proposed modification indicate a potential for impacts at these receptors higher than predicted due to Ulan Coal Mine's operations. Xstrata requests additional consideration be given to properties west of MCO's operations to consider if the proposed modification has the potential to result in cumulative air quality impacts.*

The submission raises two matters: i) the potential effects of Stage 1 (without Stage 2) are not shown separately; and ii) concerns relating to cumulative 24-hour impacts for receptors to the west.

i) The AQIA for the proposed modification was required to consider a worst case scenario and present an upper bound of potential dust levels from the MCP (as a whole) and MCP and other mines, hence it was based upon the approved Stage 1 operations (including the proposed modification) and the assumption that Stage 2 would also be operational at the same time. The advice from government specifically required the MCP assessment to present the worst case impacts that may arise from the MCP operations for both Stage 1 and Stage 2 operations cumulatively.

The air quality impacts of the proposed modification in isolation would be within the impacts shown in the AQIA for the Stage 1, as modified, and Stage 2 combined.

ii) Based on monitoring data and the AQIA of cumulative 24-hour average PM<sub>10</sub> levels in the vicinity of the MCP, the study indicates that any potential impacts would remain within acceptable levels.

Modelling prediction plots of maximum 24-hour average PM<sub>10</sub> levels present the highest predicted 24-hour average concentration at each point within the modelling domain on the worst day in the modelling period (at that point). Predicted maximum 24-hour average PM<sub>10</sub> concentrations from the Ulan Continued Operations (EA) 2009 should not be automatically added with the maximum 24-hour average levels for the proposed modification. This is because the two plots are most likely to represent maximum 24-hour average PM<sub>10</sub> levels occurring on different days at any one location, and such effects would not be cumulative in nature. For example the maximum 24-hour impacts from the Ulan Coal Mine at receptors to the west are likely to occur on a different day to the maximum impacts at these receptors due to the MCP, and should not automatically be added together. This arises as normally the highest 24-hour impacts occur in a small area downwind of a mine on a given day, and it is almost impossible for two mines that are reasonably well separated to have an impact in the one location on the same day as the mines would be along different wind axes on the same day.

In summary, cumulative 24-hour impacts can occur due to the total dust from several sources at a place on the same day, or where there is an increased number of impacts on different days due to each source. However neither of these situations is likely to arise as the two mine are on different wind tangents and would not affect one place on the same day, and the proposed new activity is unlikely to lead to any impact on any day either.

The cumulative annual average PM<sub>10</sub> contours shown in the AQIA include the Ulan Coal Mine operations as described in the Ulan Continued Operations (EA) 2009 and the maximum proposed MCP operations (approved Stage 1 and proposed Stage 2 and Stage 1 modification) and represent the likely maximum cumulative impact case reasonably accurately.

As noted previously, the AQIA uses more accurate modelling approaches than those available previously (for Ulan Coal Mine and the MCP assessments). The approach applied considers the three-dimensionally varying effects of the prevailing wind's interaction with the local topography over the life of the MCP operations. The modelling approach used will tend to better represent winds blowing along valleys and also winds that are blocked by terrain. This means that relative to the previous modelling results, some higher impacts may be shown along valleys due to valley drainage flows and wind channelling, but also some lower impacts may be shown behind shielding terrain.

### 7.1.2 Increased dust impacts

**Submissions** – S1.3, S3.8, S4.27, C5.6, C9.3, C10.8, C15.5, C16.7, C17.6, C18.4, C19.6, C21.4, C26.4, C28.3, C28.7, C29.4, C32.7, C36.5, C37.6, C38.16, C39.7, C40.2, G8.6

*A number of submissions raise potential increases in dust from the extension of mining impacting residents. Two submissions consider that, given the removal of a section of the ridgeline and the change in the micro climate, potential impacts on residents at Cook's Gap and Ridge Road have been understated.*

*In addition, three respondents contend that dust levels will be increased to unacceptable levels at residential properties and surrounding National Parks due to the proposed haul road being in excess of 12 km in length.*

The AQIA for the proposed modification provides a conservative worst case assessment of potential impacts for the indicative stages of mining. The assessment of air quality levels associated with the MCP and the incremental levels predicted under the proposed modification meet the applicable air quality criteria (ie EPA impact assessment criteria and DP&I acquisition criteria) at nearby privately-owned residences.

The air quality criteria provide benchmarks, which are intended to protect the community against the adverse effects of air pollutants, and generally reflect current standards for the protection of community health and protection against nuisance effects. There are no air quality criteria that relate specifically to National Parks, however, the following observations are made.

Dust emissions from haul roads are a significant fraction of the total dust emissions from a mine, however the dust from line sources such as roads reduces rapidly with distance from the source. This is because per unit of length, a haul road is a relatively smaller source of dust. Dust emissions from only a small section of a haul road can reach a receptor location at any one time, and so the dust concentration at the receptor is only influenced by a small amount of dust, from a small part of the haul road, and thus impacts at any receptor would be relatively low. National Parks are also less sensitive to the effects of dust, for example people are unlikely to be present in a National Park in the same location for 24-hour periods as might occur in one's home, and so people visiting National Parks would have less exposure to the potential effects of dust than people living in the area. Vegetation is also able to tolerate significantly high levels of dust than the applicable criteria without adverse effects. This is reflected by the absence of dust criteria for vegetation.

Thus, because dust levels from haul roads reduce rapidly with distance due to the long, spread out nature of the emissions source, and as the sensitivity to dust in National Parks is low, and also considering that the private residences closest to the site would meet the relevant criteria, it follows that unacceptable levels of dust at surrounding National Parks would not be expected to occur as a result of the proposed modification. It is further noted that coal truck haulage from all three open cut pits (Open Cuts 1, 2 and 3) is an existing approved activity for Stage 1.

Total (cumulative) impacts were also predicted to meet all of the relevant air quality criteria for PM<sub>10</sub>, TSP and deposited dust at all assessment locations, with the exception of an exceedance of total annual average PM<sub>10</sub> concentrations at one close commercial assessment location (Receptor 46B).

The advanced modelling approach used for the AQIA specifically incorporated the effects on the microclimate in this area. This was done to factor in the existing relatively complex array of ridges and gullies that occur, and also the effects of the mine pit itself in so far as it may deflect winds travelling across the mine. This was done for all key stages of the mine life and reflects the potential changes in the microclimate due to the changing mine pit, as it affects the on-site terrain over time. The microclimate of the prevailing winds in the various valleys and across ridges in the surrounding land, including National Parks is also a feature accounted for in the modelling.

The haul road and associated dust emissions have been included with all other sources of dust in the modelling assessment and the resulting levels were less than the acceptable levels of dust (ie. below the applicable criteria). MCO was recently required to assess its control efficiency of haul road dust emissions under a sector wide EPA imposed PRP. The EPA notes in its submission that MCO is achieving the required 80% control of dust emissions from its haul roads.

As noted above, extensive air quality monitoring will continue, with results reviewed against criteria and reported publically both in AEMRs and on MCO's website.

### 7.1.3 Management and monitoring

#### Submission – G8.5

*The EPA concurs with the establishment of an additional TEOM to the south-west of the MCP; however, considers it beneficial to establish this monitor in the near future, rather than in the mid to late lifetime of the mine, to establish background data in the area.*

MCO has committed to installing an additional TEOM to the south-west of the MCP and will consult with the EPA on the appropriate timing of the installation of the TEOM. MCO has included this commitment in its revised AQMP for Stage 1, which is pending approval from the DP&I.

## 7.2 Greenhouse gas

### 7.2.1 Assessment approach

#### Submissions – S1.17, S3.15, C37.1

*The above submissions comment on the assessment/reporting approach; namely, that the assessment fails to present the predicted greenhouse gas emissions as a percentage of NSW emissions and that the volume of emissions released by the proposed modification has been downplayed.*

The assessment approach of the greenhouse gas study for the proposed modification follows the methodology that is required to be applied in NSW, for example as detailed in the Land and Environment Court decision for the original Anvil Hill Project (now Mangoola).

Annual greenhouse gas emissions for NSW during 2009/10 are estimated to be 157.4 MtCO<sub>2</sub>-e (DCCEE, 2012). The greenhouse gas study identified that the annual contribution of greenhouse emissions from the proposed modification is approximately 0.09 MtCO<sub>2</sub>-e. In comparison to the NSW greenhouse emissions during 2009/10 the proposed modification will contribute the equivalent to approximately 0.055%. This level of greenhouse gas emissions is low in comparison to the total greenhouse gas emissions for NSW.

### 7.2.2 Climate change

#### Submissions – S1.17, S4.10, C3.3, C8.4, C9.7, C11.4, C13.1, C19.4, C22.1, C23.2, C25.10, C32.4, C38.10

*A number of submissions raise the contribution to climate change from the volume of carbon dioxide that would be generated as a result of the proposed modification. A number of these submissions also reference impacts from climate change such as global temperature increase and sea level rise. One submission also comments that Australia should not be contributing to increased greenhouse gas emissions by exporting large quantities of coal.*

As reported in the greenhouse gas study for the proposed modification, the comparison of the annual contribution of greenhouse gas emissions arising due to the proposed modification with Australia's annual greenhouse emissions is approximately 0.016%. In comparative terms, therefore, the proposed modification would have a limited contribution to Australia's annual greenhouse emissions.

Climate change impacts are the result of cumulative global greenhouse gas emissions. There is a broad range of predicted temperature increase and sea level rise due to the effect of climate change. The contribution to any change from the proposed modification is very small on a global scale. However, it is acknowledged that almost any project that generates greenhouse gas emissions would only have a small effect on a global scale, but it is the sum total of all human activities that make a significant impact on climate change. To manage this issue requires a shift in human culture, government policy and energy systems.

In this regard, the Australian Government is currently deliberating the continued implementation of a number of strategies to reduce carbon pollution and move towards a renewable energy future at a National level. This includes a price on carbon which aims to reduce the amount of carbon pollution generated through incentives for businesses to lower their carbon pollution. These strategies can change the viability of emerging technologies, and carbon intensity for new projects and can thus provide scope for lower carbon intensity at a National level. It is noted that the recently introduced carbon tax applies to the MCP and that greenhouse gas emissions must be reported under the *National Greenhouse Energy Reporting Act 2007*.

MCO will also utilise and implement various mitigation measures to minimise the overall generation of greenhouse gas emissions from the site. MCO has put in place energy saving and greenhouse gas emission reduction measures and projects, which will continue to be implemented at the MCP.

### 7.2.3 Extension of mine life

**Submissions** – S1.1, C5.3, C10.11, C14.2, C15.2, C16.2, C18.2, C21.1, C24.3, C28.4

*The above submissions state that it was unacceptable to extend the approved mine life due to the resultant extension of greenhouse gas emissions.*

A quantitative greenhouse gas assessment of the proposed modification was undertaken and the results are provided in Chapter 11 of the AQIA, and an overview is provided in Section 5.10 of the EA. In summary, it was found that greenhouse gas emissions from the proposed modification are unlikely to have any significant environmental effect in isolation.

MCO has targets for greenhouse gas emissions and energy use, as well as legal requirements for monitoring and reporting on these. MCO also has existing energy saving and greenhouse gas emission reduction measures and projects in place, which will continue to be implemented, inclusive of the proposed modification. These will be revised as required to respond to new information, technologies and policies as they evolve.

The proposed modification is consistent with MCO's commitments under the Mining Act and mining leases, which require MCO to maximise the extraction of the State's coal resource subject to environmental and economic considerations.



## 8 Other matters

### 8.1 ESD considerations

#### **Submissions** – S3.18, C13.2, C41.6

*The above submissions contend that the EA does not adequately assess the proposed modification in accordance with ESD principles.*

The principles of ESD, as outlined in Section 6 of the NSW *Protection of the Environment Administration Act 1991* and Schedule 2 of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), are listed in Section 22.2 of the EA. These principles were considered throughout the environmental assessment and project development process.

A number of mine plan design options were considered during project development. An environmental risk assessment was completed to ensure environmental risks were considered in the preliminary mine design. This enabled identification of environmental risks and risk management controls that could be incorporated into the optimised mine design to avoid, eliminate or reduce the level of risk associated with carrying out the proposed modification.

The proposed modification achieves a balance between maximising resource extraction and minimising environmental and community impacts.

Assessment of the proposed modification was undertaken in accordance with the EP&A Act and EP&A Regulation. Feedback received from community and government stakeholders also guided the assessment. Tables 6.2 and 6.3 in the EA demonstrate that all matters raised during consultation have been addressed in the EA.

The EA was then prepared in accordance with relevant guidelines and legislation using the most recent and accurate scientific data available. Technical studies adopted conservative assumptions to enable the upper limit of potential impacts to be determined. Following the initial findings of a number of studies, including surface water and noise, the mine design was modified to incorporate additional amelioration measures. Further, MCO has committed to a range of management, monitoring and offset measures that will be implemented throughout the life of the proposed modification, to prevent and/or minimise adverse impacts.

The consistency of the proposed modification with each of the principles of ESD is described in Section 22.2 of the EA. It is therefore considered that the proposed modification has been fully assessed in accordance with the ESD principles.

## 8.2 Scale of the proposed modification

**Submissions** – S1.2, S3.3, S4.1 S4.6, C5.1, C5.2, C8.1, C10.1, C14.1, C15.1, C16.1, C17.1, C18.1, C19.1, C21.6, C25.1, C26.1, C27.1, C28.1, C29.1, C30.1, C31.1, C32.1, C33.1, C37.3, C38.1, C39.1, C41.1

*The above submissions refer to the scale of the proposed modification combined with the approved Stage 1 operations. They raise concern that increasing the footprint of the currently approved open cut areas by 25% amounts to a significant expansion that would significantly impact the surrounding environment and community. A number of submissions refer to the creation of a ‘super pit’ measuring 886 ha. The Central West Environment Council’s submission states that there is a 25% increase in the current approved disturbance area.*

The proposed modification seeks to extend the disturbance footprint (ie direct clearing) of Stage 1 by approximately 178 ha. This equates to an increase of approximately 15% in the extent of land area that will be directly cleared as a result of Stage 1. However, not all of this land will be disturbed at the one time. Rather the mine plan sets out a progressive sequence of mining and rehabilitation such that only a small area of land is open to mining at any one time. Hence there will be no development of a ‘super pit’ 886 ha in extent.

The proposed modification allows for the continued orderly and economic development of land and resources for the purposes of mining, through the extension of mining in approved Open Cuts 1 and 2. There will be no change to the maximum annual rate of coal production or extraction, mining methods, employee numbers, operating hours, coal handling and processing, coarse rejects and tailings management, site access or external coal transport.

The intent of the optimised mine plan, which forms the basis of the EA (refer Section 8.1 above), is to maximise resource recovery, whilst minimising adverse environmental and community impacts. The proposed modification is consistent with MCO’s requirements under the Mining Act and mining leases to maximise the extraction of the State’s coal resource subject to environmental and economic considerations.

MCO has committed to a range of measures to prevent, minimise and/or offset the potential adverse impacts, as identified in the statement of commitments (EA Chapter 21). Subject to the implementation of these measures, it is assessed that the potential environmental and community impacts from the increased mining area are largely similar to those approved under Stage 1 and, therefore, will not be ‘significant’.

## 8.3 Alternatives

**Submissions** – C8.5, C13.7, C19.3, C21.4, C23.4, C26.6, C36.6, C38.9, C39.10

*One submission contends that MCO should pursue underground rather than open cut mining. Other submissions contend that the EA does not adequately analyse feasible alternatives.*

Underground mining of the target resource is not economically viable. This is addressed in Section 5.3.

As noted in Section 8.2 above, MCO has an obligation under the Mining Act to maximise the recovery of the State's coal resource. Accordingly, feasible alternatives were limited to options for extending the approved open cut areas. Alternatives are canvassed in Section 4.4 of the EA, including variations to the proposed extension areas and the 'do nothing approach'. The preferred option, which constitutes the proposed modification, was pursued as it will enable the efficient extraction of a relatively low strip ratio coal resource (in excess of 30 Mt) whilst minimising environmental and community impacts. In addition to accessing substantial additional coal reserves, the proposed modification will greatly improve mining efficiencies in Open Cuts 1 and 2 will increase the safety of the mine and will enable energy efficiencies to be realised. This demonstrates that feasible alternatives have been adequately considered in the EA.

*A number of the submissions include general statements relating to alternative sources of sustainable energy, which should be pursued ahead of coal.*

Growth in the renewable energy sector is predicted to occur, however, so is demand for fossil fuels, including coal. According to the International Energy Agency (IEA) (2011), coal consumption predicted in 2035 is at least similar to total world coal demand in 2009. There is no evidence to suggest that the MCP will impede use of, or investment in, other energy sources.

*Two submissions suggest the use of an enclosed conveyor system rather than haul roads to transport coal to the CHPP, to minimise traffic movements and associated noise, air quality and visual impacts.*

No changes to infrastructure beyond those related to water management are proposed under the modification. The construction and operation of a conveyor in place of haulage by internal roads to the CHPP is not economically viable.

Studies of the potential impacts of the proposed modification in respect of noise and air quality assessed the haulage of coal by internal haul roads to the CHPP. The assessments are presented in EA Appendices C and D and conclude that impacts for air and noise are largely within the predictions assessed and approved for Stage 1 (refer also to Chapters 6 and 7). The environmental bund will provide effective mitigation of visual impacts from the haul road. The requirement for best practice air quality, noise and visual management measures to be implemented at the MCP is reflected in the respective management plans. These will be updated to include the proposed modification, facilitating continual improvement in management and mitigation.

## 8.4 Cumulative impacts

**Submissions** – S1.1, C2.2, C2.3, C2.4, C3.6, C4.2, C6.2, C7.2, C11.5, C12.1, C15.8, C23.3, C29.7, C34.4, C36.7, C38.19, C40.6, C42.3, C42.4, C42.5

The above submissions raise potential cumulative social impacts and impacts on other industries.

*A number of submissions contend that the proposed modification will result in general disturbance to and depopulation of the local community.*

Environmental and social impacts of the proposed modification that could result in a general disturbance to the local community have been assessed as part of the EA. As mentioned, MCO has committed to a range of management and/or monitoring measures that will be implemented throughout the life of the proposed modification, to prevent and/or minimise adverse impacts. Impacts are predicted to be largely similar to those associated with existing approved operations.

Noise and dust are two of the main impacts of mining that can potentially cause disturbance to local communities. Accordingly, comprehensive studies were undertaken by suitably qualified and experienced technical specialists in accordance with relevant guidelines. Both studies concluded that residual impacts would generally be within previously assessed and approved predictions.

Minor depopulation in the surrounding localities has occurred as a result of MCO's (and Ulan and Wilpinjong Coal Mine's) acquisition of properties, to establish suitable land buffers against excessive mine related noise and dust impacts. However, wherever appropriate and practicable, MCO provides a lease back arrangement to enable acquired properties to be fully utilised and to help sustain the local population. Where properties have been purchased by MCO, they have been subject to a building compliance inspection and, where required, buildings have been upgraded before being returned to the rental market.

As described in the EA, the proposed modification will not result in increased noise or dust impacts that will require the acquisition of any additional private residences to that already set out in the existing conditions of approval for the project. Accordingly, it is not expected that the proposed modification will directly result in changes to the current population.

The proposed modification will enable MCO to continue to actively support the local community both directly as a local employer and indirectly through economic contributions to improve public infrastructure funding and for community projects in the local region.

All permanent MCO employees live within 100 km of the MCP, as required by MCO's internal recruitment policy. This negates the requirement for 'fly-in-fly-out' or 'drive-in-drive-out' (ie those employees that drive in and leave at the end of their roster) workers, ensuring that all permanent employees live in and are part of the local community.

A significant number of positive submissions were also received from various stakeholders, including residents in the immediate locality of the MCP. These identified the potential benefits of the proposed modification, which included amongst other things, employment, economic contributions and community investment, all of which can be considered as providing a positive impact on the local community.

*One submission contends that depopulation has led to a reduction in small rural schools such as Wollar and Ulan, threatening the viability of these schools, which are an integral part of the local communities.*

The proposed modification is not predicted to change the current local population and a reduction in enrolments at the Ulan school or an impact on the Wollar school is not anticipated as a result of the proposed modification. MCO's Community Support Program will continue to provide contributions to local schools to help meet the needs of the students and maintain the viability of the schools as an integral part of the local community.

*One submission contends that Mining companies buying and leasing-back farms has terminated historical family tenures dating from the early 19th century.*

The proposed modification includes only mine-owned and Crown land and, as such, there will be no requirement for MCO to purchase any private residences. There will be no direct impact to any private residences as a result of the proposed extension areas and no indirect requirement for the acquisition of additional private residences.

The historic heritage study (EMM 2013c) (EA Appendix G) identified that no historic heritage items will be impacted by the proposed modification. Management and monitoring of known heritage items in the vicinity of the proposed extension areas will continue under MCO's Heritage Management Plan (HMP). In the unlikely event that unknown heritage items are identified, protocols included in the HMP for recording and conserving these items will be adhered to.

It is noted that properties and/or infrastructure acquired by MCO that are provided under lease back arrangements will be maintained for potential ongoing use post mining. Further, that acquisition agreements often include providing the prior land owner with the first right of acquisition post-mining.

*Several submissions raise the changing character of the area with respect to Mudgee's reputation for tourism, wineries and agriculture.*

The MWR LGA has a diverse economy with significant agriculture, viticulture, mining, tourism accommodation/food services and retail sectors. Coal mining has been occurring in the region since the 1920s and is the most significant sector in the economy for output, value-added income and employment. Tourism and viticulture have continued to expand in the region over the past 100 years, concurrent with the expansion of mining, and it is expected that these industries will continue to co-exist in the region in the future.

The proposed modification will continue to operate with the same number of employees and will not adversely impact on existing wineries or tourism. The vast majority of the proposed extension areas are unsuited to agriculture. The small portion (15.7 ha) of Class 3 (Riddler 1996) agricultural land that will be disturbed by the proposed modification will be reinstated to grazing land post-mining.

## 8.5 Visual amenity

**Submissions** – S1.1, S4.26, C8.2, C19.11, C25.3, C38.15, C39.5, C39.15

*The above submissions raise concerns about visual impacts of the proposed modification. Two submissions relate specifically to the excavation of the ridgeline and associated impact on the local landscape and amenity, given that the excavations would be visible from multiple points in the landscape, including residences on Ridge Road and at Cook's Gap. Two of the submissions contend that the suggested use of overburden and tree planting is inadequate and investigating the feasibility of targeted vegetation planting to screen affected properties along Ridge Road is an ineffectual response.*

MCO acknowledges that some visual impacts are unavoidable, especially in the early phases of mining. To ensure the impacts of the proposed modification are minimised MCO has committed to a range of management and mitigation measures, including:

- progressive rehabilitation;
- visual screening measures such as tree and shrub planting; and
- operational screening measures such as landform re-establishment sequencing and lighting management.

Of the 12 viewpoints assessed as part of the visual study (EMM 2013d) (EA Appendix H), only one viewpoint (VP6), to the northern end of Ridge Road, was considered to have a moderate/significant visual impact. This was due to the elevated location of the viewpoint and the lack of intervening topography. However, it should be noted that many of the properties along Ridge Road will not have a direct line of sight to mining operations.

Where visual impacts to residential properties are unavoidable targeted screening in the foreground is considered the most appropriate approach to achieve a short term buffer to mining activities and light spill from machinery operating on the upper areas of the ridgeline. This and other specific measures include:

- the investigation of the feasibility of targeted vegetation planting for affected properties along Ridge Road, to mitigate the visual and lighting impacts of the proposed modification where properties on Ridge Road will have direct views from the residence of both the proposed Open Cut 1 and Open Cut 2 extension areas;
- the establishment of out-of-pit embankments first so that continued operations are obscured by the embankment. Outer faces of the embankments will be seeded and grassed as soon as possible to soften the view to exposed workings;
- maintaining a strip of vegetation, where possible, along the leading face of the ridgeline associated with the proposed Open Cut 1 extension area for as long as practical. This will provide a visual screen to workings behind and thereby limit the time viewers will be exposed to workings and lighting in this area;
- the establishment of operational protocols for setting up mobile lighting plant such that lighting is directed away from external private receptors;
- the establishment of design and operational protocols such that lighting sources are directed below the horizontal to minimise potential light spill; and
- the avoidance of lighting of light coloured surfaces which have greater reflectivity.

Whilst the use of overburden emplacement, which has been used to create the environmental bund adjacent to Open Cut 1 (and will be constructed adjacent to Open Cut 2 as mining progresses), is an effective screen to mining activities from viewpoints close to the MCP, it is acknowledged that this will not be an effective mitigation measure for elevated viewpoints further away from the mine. In this case, the use of targeted planting will be a more effective measure that will help mitigate the temporary visual impacts of the proposed mining activities.

## 8.6 Aboriginal heritage

**Submissions** – S1.16, S3.12, S3.13, C42.3, G7.27, G7.28

*The OEH submission recommends that further justification be provided as to how all registered Aboriginal parties (RAPs) have been consulted. Further justification is also sought on how comments raised by the Murong Gialinga Aboriginal and Torres Strait Corporation have been addressed.*

Consultation with RAPs was undertaken in accordance with MCO's consultation strategy, as outlined in the then draft Aboriginal Heritage Management Plan (AHMP) for Stage 1. The AHMP was approved by DP&I in May 2013.

The registered Aboriginal stakeholders for the Stage 1 project comprise the North East Wiradjuri Co. Ltd (NEW Co) the Mudgee Local Aboriginal Land Council (MLAP), Warrabinga Native Title Claimants Aboriginal Corporation (WNTCAC), Murong Gialinga Aboriginal and Torres Strait Islanders Corporation (MGATSIC) and an individual, Mr Craig McConnell.

The proposed methodology for the Aboriginal cultural heritage assessment (ACHA) (Kuskie 2013) (EA Appendix F) for the proposed modification was provided to all of the above RAPs and their representatives at the commencement of survey activities. A representative from each of the RAPs was involved in the survey of the proposed extension areas. On completion of the draft ACHA for the proposed modification a copy was sent to all RAPs seeking comments. Comments were received from MGATSIC and NEW Co and any concerns raised were addressed by MCO's Cultural Heritage Officer. All RAPs were notified when the EA was finalised and placed on public exhibition.

Consultation with the RAPs was undertaken in accordance with the approved AHMP, which was updated to include the proposed extension areas. MCO is committed to working with the local Aboriginal stakeholders and will update the AHMP to include additional parties or individuals identified by the RAPs for Stage 1 or OEH.

MGATSIC states in its submission for the proposed modification that 'they don't support mining generally but agree and support the recommendations in the draft report'. Other matters are raised in relation to recent drilling activities, which relate to the wider Stage 1 project and are not associated with the proposed modification. MCO notes the comments and will liaise with the MGATSIC in relation to future drilling activities.

*Other submissions contend that the EA does not adequately consider the cumulative loss of Aboriginal cultural heritage sites. One submission contends that the assessment judges all identified Aboriginal sites to be of low significance without completing the full suite of archaeological work required to identify significant features, particularly potential archaeological deposits (PADs) in rock shelters.*

The ACHA was undertaken for the proposed modification in accordance with the OEH draft *Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DEC 2005). The ACHA was prepared to identify, assess and manage the Aboriginal cultural heritage values associated with the proposed modification. This included desktop research and field survey in consultation with registered Aboriginal stakeholders. A total of 33 Aboriginal sites, including PADs, were identified. A detailed model of Aboriginal occupation was prepared (refer to Section 3.4 of the ACHA) as well as a predictive model (refer to Section 3.5 of the ACHA) which guides the assessment of potential deposits in rock shelters and open sites. Contrary to the contention in the submission referenced above, specific discussion of the assessment of potential deposits in rock shelters is provided in Sections 5.2.2, 5.3.3 and 7.2 of the ACHA.

The cumulative impacts of the proposed modification on Aboriginal cultural heritage were considered as part of the ACHA. Assessing cumulative impacts on Aboriginal cultural heritage at a broad scale involves:

- comparing the identified archaeological evidence and cultural values with the outcomes of other Aboriginal cultural heritage studies in the region (and known site databases); and
- examining topographic mapping and aerial photographs to identify if comparable environmental contexts exist elsewhere in the region, in which similar predicted archaeological evidence and cultural values may occur.

The cumulative impact of the proposed modification with respect to the approved Stage 1 and proposed Stage 2 operations is considered in Section 9 'local context' of the ACHA. The ACHA found that no specific aspect of the identified archaeological evidence and cultural values within the proposed extension areas is rare or unique at a local or regional context. Hence the impacts of the proposed modification on Aboriginal cultural heritage will be very low within a regional context. It is considered that the cumulative impacts on Aboriginal cultural heritage have been adequately assessed.

## 8.7 Rehabilitation

**Submissions** – S1.12, C1.4, C11.3, C25.9, C39.6

*These submissions relate to rehabilitation and contend that the mined land will not be adequately remediated in the long term and that costs associated with post mining rehabilitation will not be sufficiently met by MCO.*

The objectives for rehabilitation of the proposed extension areas reflect the objectives, commitments and requirements of the Stage 1 approval, which are detailed in MCO's current MOP, prepared in consultation with and to the satisfaction of DTI. In line with MCO's existing commitment to return areas disturbed by mining operations to their pre-mining land use, the proposed extension areas will be rehabilitated as described in Section 4.3.3 of the EA.

As discussed in Chapter 5, MCO is committed to progressively rehabilitating disturbed areas as soon as practical following mining, which will be undertaken concurrently with staged mining activities. This commitment is reflected by MCO's ongoing rehabilitation within the Open Cut 1 mining area, where to date, 130 ha of disturbed land (to the end of March 2013) is being progressively rehabilitated with Box Gum Woodland and Sedimentary Ironbark Forest vegetation species. MCO's LMP includes measurable performance criteria that will continue to transparently track the success of the rehabilitated land including areas disturbed under the proposed modification.

In addition, MCO is required to provide a bond against its rehabilitation requirements under the mining lease. The bond is required to cover the full cost of rehabilitation and will only be relinquished when MCO can demonstrate it has met the agreed rehabilitation completion criteria, to the satisfaction of DTI.

It is therefore concluded that mined land will be adequately remediated in the long term and costs associated with post mining rehabilitation will be sufficiently met by MCO.

*One submission contends that the location of the haul road down the centre of the open cut mine will severely limit progressive rehabilitation and clean water management.*

The location of the haul road shown on the conceptual mine plans presented as Figures 4.1 to 4.5 of the EA was intentionally positioned and will be constructed in a specific mining sequence to minimise environmental impacts such as noise, dust and visual amenity. The location of the haul road will not limit progressive rehabilitation or clean water management within the mined areas. These activities will be undertaken in accordance with the LMP and the WMP, respectively. Both management plans, required under the Stage 1 approval, will be updated to incorporate the proposed extension areas and will be reviewed by the DP&I in consultation with the relevant government agencies.

*One submission contends that the restoration of a stable catchment depends on successful and progressive rehabilitation and revegetation of the disturbed footprint. However, many of the open cut pits remain open for the life of the mine to allow for coal haulage and water storage for mine operations.*

Open cut pits will not remain open for the life of the mine. As previously discussed, rehabilitation forms an integral part of the progressive mine sequence. That is, all mined areas will be progressively rehabilitated as soon as practical following the mining sequence. MCO's rehabilitation commitments are described in detail in its LMP. The haul road and water storage facilities are necessary components of open cut mining that will be required until the completion of mining.



## 8.8 Health

### Submissions – C4.1, C17.8

*These submissions raise concern regarding impacts to the human health and the quality of life of local communities generally. One of these submissions specifically mentioned the increase risk of stress and the potential to cause mental health problems.*

A range of factors can influence how people perceive risk and the level of stress they may experience. Not all these factors are in the control or influence of the MCP. MCO has tried to minimise the potential for project-related stress and concern in the community through ongoing community consultation. Stage 1 approval conditions required the establishment of a Community Consultative Committee to keep the community informed on the progress of the mine and provide a forum for open discussion between representatives of MCO, the community, MWRC and other stakeholders. A community information session was held specifically in relation to the proposed modification, to enable members of the community to raise concerns and have questions answered by representatives from MCO and technical specialists involved in the preparation of the EA on a range of matters.

Quality of life can be influenced by a range of factors including fulfilment of physiological requirements (food, shelter), environment (acceptable standards of noise, air and water quality), social requirements (family connections, friends, sense of community), health (sanitation, disease prevention, health treatments) and spiritual aspirations (self-determination, right to live according to own values, right to associate, right to free speech). The proposed modification has no potential to affect the majority of these factors.

Comprehensive technical studies were undertaken for the proposed modification to assess potential air quality, noise and blasting impacts, which have the potential to cause adverse health impacts. Each assessment was undertaken in accordance with the relevant regulatory guidelines and concluded that predicted impacts are largely similar to those assessed and approved for the Stage 1 operations. As discussed previously, MCO has committed to a range of management, mitigation and monitoring measures. These are outlined in MCO's statement of commitments (EA Chapter 21) for the proposed modification and will ensure any associated impacts are minimised to the greatest extent possible.

It is acknowledged that some stakeholders disagree with the proposed modification; however, this alone does not indicate a direct impact on human health or quality of life. As mentioned previously, stakeholders consulted also identified the potential benefits of the proposed modification, which include employment, economic contributions and community investment, all of which could be considered to provide a positive contribution to quality of life.

## 8.9 Traffic and transport

### Submissions – C10.10, C17.7, C30.2, C32.2, C40.3, C40.6, G1.2, G3.1

*One respondent raises road traffic and train increases generally, and specifically in relation to increased road traffic through Yarrowa Road near Denman, which is used by mine workers travelling west as a 'short-cut'.*

The proposed modification does not seek approval to increase current production levels and, therefore, no additional train movements are proposed.

As discussed in Chapter 18 of the EA, the proposed modification does not incorporate any increase in employee numbers or changes to traffic conditions, including through Yarrowa Road near Denman. The proposed modification will not increase existing or estimated future road traffic volumes associated with the MCP from those currently approved. All vehicle movements for coal and overburden haulage will remain on internal haul roads.

The above is noted by RMS in its letter dated 24 June 2013 to the DP&I which states that 'as the proposed modification does not seek to increase the number of road or rail movements beyond current approvals, RMS will not be making a submission'.

*MWRC notes that contributions to the road network have been an ongoing issue. Nevertheless, the Ulan Road Strategy has been negotiated over a 20 year maintenance period. This would accommodate the Stage 1 approval period as extended to 2033. The Stage 1 MCP approval does not require MCO to enter into the upgrade agreement. Although this may be conditioned under Stage 2, if approved, it is considered that this be conditioned in the Stage 1 MCP approval. One submission contends that the Ulan Road Strategy is inadequate and State Government assistance is required. Several submissions raise safety concerns regarding the maintenance and repair of the local road network.*

Although not required under the Stage 1 approval, MCO has committed and contributed to the Ulan Road Strategy, prepared by ARRB Group Ltd (ARRB) (2011) on behalf of Ulan and Wilpinjong Coal Mines and the MCP.

While the Ulan Road Strategy is outside the scope of the proposed modification, MCO will continue to consult with MWRC in relation to any required local road upgrades. Notwithstanding, MCO anticipates an additional condition relating to its specific involvement in the Ulan Road Strategy as part of the proposed modification.

Any requirement for State Government assistance is a matter for government.

Road safety audits have been undertaken on the local road networks as part of previous Stage 1 and Stage 2 assessments. The audits identified two areas that required further consideration, being road edge delineation and road edge formation and shoulder provision. MCO's existing voluntary planning agreement (VPA) with MWRC (Appendix 4 of MP 05\_0117) includes specific financial road maintenance contributions of \$2.25M.

The proposed modification does not seek to increase employee numbers or the mine's traffic generation potential beyond that currently approved and, therefore, no additional road impacts will be experienced.

*Crown Lands notes that the use of Crown road areas will require the roads to be closed under the Roads Act 1993 and either purchased or some other access/occupation arrangement authorised.*

Applications (Id ref: W411578 and W411586) for the closure of roads required under the Stage 1 approval were lodged with the NSW Land and Property Information in October 2008. MCO has been advised that these applications are still being assessed. Road closures are not required under the proposed modification.

*Crown Lands also notes that the occupation of Lot 7010 DP 1025345 will need to be authorised under the Crown Lands Act 1989. In relation to this land it is also advised that its reservation includes a restriction 'from sale or lease other than Annual Lease'.*

MCO is aware that the occupation of Lot 7010 DP 1025345 will need to be authorised under the *Crown Land Act 1989*, unless MCO is entitled to enter and be on that land pursuant to rights conferred by a mining lease in force in respect of that land, subject to the provisions of the Mining Act. Accordingly, MCO is in discussion with the Dubbo Lands Office regarding access to this land.

## 8.10 Economics

**Submissions** – S1.8, S1.9, S1.15, S1.18, S3.14, C9.1, C12.3, C35.4, C38.6, C38.8, C38.9, C38.12, C38.13, C39.11, G1.1

The above submissions raise economic considerations.

*A number of submissions contend that the economic study has not adequately assessed the costs of the environmental impacts, including specifically:*

- *long term costs associated with the decline of water quantity and quality in the Upper Goulburn River, which is impacting on downstream river ecology and other water users;*
- *costs of the impacts to adjacent native species;*
- *long-term costs to the local community from increased drought, bushfire and extreme storm events; and*
- *costs of climate change as a result of increased greenhouse gas emissions.*

The benefit cost analysis (BCA) undertaken as part of the economic study (Gillespie 2013) of the proposed modification (EA Appendix L) is a way of logically and rationally organising information on the economic efficiency of a resource reallocation. In this framework there is a trade-off between the net production benefits of the proposed modification and the potential environmental impacts. The net production benefits of the proposed modification to Australia are estimated at \$188M or \$227M when non-market employment benefits are considered. This can be used as a value against which the relative value of the residual environmental impacts of the proposed modification may be assessed. All incremental residual environmental impacts from the proposed modification, that impact Australia, would need to be valued by the community at greater than \$188M (and \$227M when non-market employment benefits are considered), for the proposed modification to be questionable from an economic efficiency perspective.

The BCA went a step further and gave qualitative and quantitative consideration to the potential environmental impacts of the proposed modification. This was based on the technical assessments provided in the EA. Only where there are material residual impacts, and these affect the welfare of consumers or producers, are there environmental costs for inclusion in the BCA.

Contrary to claims in submissions, the surface water study (EA Appendix I) and groundwater study (EA Appendix J) did not identify any significant decline in water quality or quantity as a result of the proposed modification. MCO is required to hold licences to account for water take and the estimated market value of obtaining these licences was included as an opportunity cost in the BCA.

The ecological study (EA Appendix E) reported that the proposed modification will include native vegetation clearing including endangered ecological communities and non-threatened native vegetation. The BCA identified that the clearing of native vegetation will result in some loss of non-use values held by the community for this biodiversity. However, in accordance with NSW government policy, MCO proposes to secure suitable biodiversity offsets. The BCA identified that the provision of offsets will result in some gain in non-use values held by the community for this conserved biodiversity. The BCA included the capital and management cost of the proposed offsets. Provided that the community values for impacted biodiversity are counterbalanced by the community values for the biodiversity offsets no significant further economic cost would arise that would warrant inclusion in the BCA. It is noted that NSW government policy requires offsets to improve or maintain ecological values.

The BCA identified that the proposed modification will generate greenhouse gas emissions and recognised that these may result in impacts. An economic value was placed on greenhouse gas emissions that reflected its social costs, that is present value of additional economic damages now and in the future caused by an additional tonne of CO<sub>2</sub>-e emissions. This incorporates any costs associated with increased drought, bushfire and extreme storm events.

Environmental impacts such as to visual and noise amenity were also included in the BCA through the inclusion of the capital and operating costs of the environmental mitigation measures. Other technical assessments found impacts to be generally minor and were therefore considered negligible in the BCA framework. As identified in the NSW government *Guideline for the use of Cost Benefit Analysis in mining and coal seam gas proposals (2012)*, there is a practical principle of materiality – costs and benefits that will not have a material bearing on the decision do not need to be included in a BCA.

As previously indicated, the proposed modification is estimated to have net social benefits to Australia of \$227M (including non-market employment benefits) and hence is considered justified from an economic efficiency perspective.

*MWRC considers that the Council rate base is being eroded due to project approvals requiring biodiversity offsets. The proposed modification further expands offset requirements and will result in either further land being dedicated as national park or the establishment of conservation agreements. MWRC considers that, where there is an adverse impact on the regions rate base due to the change in land tenure, compensation should be provided.*

MCO notes that biodiversity offsets are a requirement of NSW government policy. Hence the erosion of Council's rate base as a result of this requirement is a matter for Council to resolve with the State and Federal governments who ultimately determine the extent of the required offsets and the mechanism under which offsets are secured for long-term conservation outcomes.

MCO also notes that under the conditions of the Stage 1 approval, it was required to enter into a VPA with Council. The value of the VPA (in 2007 \$ terms) is \$4.55M. This funding is required to support various Council activities that the rate base would otherwise support. The schedule of payments to be made by MCO to Council under the VPA is set out in Appendix 4 of the Stage 1 approval, with \$1.3M earmarked for general consolidated revenue, \$2.25M for local road maintenance and \$1M for community infrastructure. In addition, MCO will contribute additional funding to the upgrade and maintenance of Ulan Road, as determined under the Ulan Road Agreement between the three mines and Council. MCO believes the value of these contributions combined with the other economic benefits the mine brings to the local region adequately compensates Council for any loss in rates associated with the requirement to offset its biodiversity impacts. Further, MCO strongly supports the 'royalties for regions program', which would see a percentage of royalty payments made by the mines returned to the local region for investment in local infrastructure projects.

*Two submissions contend that the economic assessment is based on the assumption of the long term economic value of coal when market conditions are uncertain and social and environmental factors are changing.*

The economic study (EA Appendix L) considers the economic rather than financial costs and benefits of the proposed modification. In competitive markets, financial values may also reflect economic values. This was the case for the value of coal and the operating and capital costs of the proposed modification. Qualitative and quantitative consideration was also given to the potential non-market environmental costs of the proposed modification.

The BCA included sensitivity testing on the value of coal to test the uncertainty in the future coal price. Even with a sustained 20% reduction in coal value, which is highly unlikely, the proposed modification is estimated to have net social benefits to Australia.

## 8.11 Agriculture

### **Submissions – C2.4, C40.5, G5.1**

*These submissions object to the loss of agricultural land which, one submission contends, would adversely impact rural suppliers and local businesses.*

With the exception of a small area (15.7 ha) in the south-west corner of the proposed Open Cut 2 extension area, the current landform of the proposed extension areas presents a severe constraint to agricultural production. The land capability class (DLWC 1998) of the proposed extension areas is between Class IV and VII, with the majority Class VII ‘extremely severe limitations’ where most land uses are restricted and limitations cannot be overcome. The agricultural suitability of the proposed extension areas is classified (Riddler 1996) as Class 3, 4 and 5, with the majority being Class 5, ‘land unsuitable for agriculture or best suited to only light grazing’.

In accordance with MCP’s rehabilitation requirements and commitments, the small area (15.7 ha) of Class 3 agricultural land that will be directly impacted by the proposed modification will be reinstated for agricultural purposes post mining. Hence the proposed modification will only temporarily impact a small area of agricultural land.

It is noted that NSW Agriculture’s submission states that it has ‘no concerns with the [proposed modification] on the understanding that most of the land to be impacted by [the proposed modification] is land unsuitable for agriculture’.

In addition, agricultural land acquired by MCO for noise and dust management purposes may be leased back to the prior owner for ongoing agricultural use.

Therefore, it is not anticipated that the proposed modification will adversely affect rural suppliers or local businesses in the agricultural industry.

## 8.12 Assessment and approval process

**Submissions** – S1.7, S3.1, S3.2, S4.2, S4.3, S4.4, S4.5, S4.12, S5.1, C1.2, C9.10, C13.2, C13.3, C13.4, C13.5, C24.2, C33.2, C38.3, C38.8, C38.11, C38.17, C39.2, C41.6, C42.1, C42.2, C43.4

The above submissions relate to the assessment process and planning system generally.

*Several submissions relate to the assessment and approval process for modifications to existing major project approvals, commenting that:*

- *the proposed modification is an attempt via stealth to significantly increase the size of the mine;*
- *expansion by increment is an abuse of the planning system; and*
- *the assessment and approvals process is tokenistic.*

The EP&A Act and accompanying Regulation provide the framework for environmental and land use planning in NSW and include provisions to ensure that proposals which have the potential to impact the environment are subject to detailed assessment, and provide opportunity for public involvement.

As considered in Chapter 5 of the EA, Section 75W of the EP&A Act enables the Minister to modify a project approval granted under Part 3A of the EP&A Act. The general requirement for approval of a modification under Section 75W is that the proposed modification must have limited environmental consequences beyond those which had been the subject of assessment of the original project assessment, as consented by the Minister for Planning and Infrastructure.

The features of the proposed modification and the scale of its environmental impacts, as provided in Chapters 8 to 20 of the EA, enable the proposed modification to be prepared and assessed under Section 75W of the EP&A Act. The extent of relative change involved in the proposed modification is not of a magnitude so as to constitute a radical transformation of the approved Stage 1 project or the terms of the Stage 1 project approval.

*One submission contends that the proposed modification is inconsistent with objects of the EP&A Act, including the protection of remnant native vegetation, threatened species, water and catchment values, ESD principles, and inter-generational equity.*

Chapters 8 to 20 of the EA examine the potential environmental, social and economic impacts of the proposed modification in accordance with the EP&A Act. As substantiated in Chapter 22 of the EA, the proposed modification is consistent with the objects of the EP&A Act (refer also to Section 8.1).

*Another submission contends that the proposed modification is inconsistent with Commonwealth legislation and strategies binding on State Government and international obligations.*

The Commonwealth EPBC Act aims to protect matters deemed to be of NES, including threatened flora and fauna species and ecological communities.

The original Stage 1 application was referred to the SEWP&C and deemed a controlled action under the EPBC Act, and approval was subsequently granted under Part 9 of the EPBC Act.

The ecological study (EA Appendix E) found that one matter of NES was considered likely to be significantly impacted by the proposed modification, being approximately 16.5 ha of White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grasslands. As such, a referral of proposed action has been submitted to SEWPaC. If deemed to be a controlled action, SEWPaC will stipulate the assessment requirements and approval pathway.

MCO will continue to undertake the necessary level of assessment and obtain the relevant State and/or Commonwealth approvals prior to commencing work associated with the proposed modification. International obligations are not within the scope of this report.

*Several submissions highlight that no Director-General's Requirements were issued for the proposed modification's EA.*

It is within the Director-General's discretion as to whether or not he will issue environmental assessment requirements in respect of a request to modify an approval under Section 75W.

Although no environmental assessment requirements were issued, as noted in Section 1.4 of the EA, environmental risk assessment and scope development workshops, together with an extensive stakeholder engagement program, were used to inform the key issues requiring detailed assessment. All issues identified have been described and assessed in detail in the EA.

*Xstrata objects to the proposed modification on the basis that an area of land owned by Ulan Coal Mines within the extension area of the proposed modification is not currently covered by a mining lease.*

MCO will apply for a mining lease in respect of the area identified in the Xstrata submission. However, it should be noted that, any such mining lease cannot be granted until after approval of the proposed modification. Pursuant to Section 75V(1)(c) of the EP&A Act, the Minister for Mineral Resources cannot refuse to grant a mining lease for the extension area if the proposed modification is approved.

*The following matters were identified in a number of submissions as requiring consideration by the DP&I in the assessment of the proposed modification:*

- *recent findings in the Warkworth decision, including the destruction of social fabric and ESD principles, including the precautionary principle; and*
- *existing cumulative impacts of the current operations at Moolarben combined with the impacts of the Wilpinjong and Ulan operations.*

*A number of submissions stated that further studies and/or actions should be undertaken prior to the DP&I consideration of the proposed modification and any other mining proposals in the Ulan region. These comprise:*

- *an independent regional water study on the current cumulative impacts of open cut and longwall mining operations on the Upper Goulburn River water source, which consider all current conditions of approval for the Ulan, Moolarben and Wilpinjong projects, the effectiveness of current Environment Protection Licences and the ability of the projects to operate within these regulations;*
- *an independent assessment of noise, dust and environmental amenity impacts of the proposed modification, which should be conducted by a firm of consultants that have no history of working for the coal industry;*
- *inclusion of The Drip and Corner Gorges into the National Park; and*

- *the proposed modification should not be approved prior to the Stage 2 application, to ensure that all impacts are assessed as a whole.*

*One submission includes a general statement that the continued dependence of DP&I on information supplied by consultants employed by the mining industry has led to a number of major negative cumulative impacts in the Ulan region.*

Whilst the above matters are for the consideration of DP&I and are generally outside the scope of this report, the following points are made.

- Matters related to ESD and social impacts are considered in Sections 8.1 and 8.4, respectively.
- Operations at Wilpinjong and Ulan Coal Mines were taken into account in the assessment of the cumulative impacts of the proposed modification.
- Submissions related to noise and air quality are addressed in Chapters 6 and 7, respectively.
- The inclusion of The Drip in a National Park is discussed in Section 4.3. The Corner Gorge is not owned by MCO and therefore MCO has little or no influence on its conservation status.
- Stage 2 was considered where applicable in EA to enable the assessment of potential worst case impacts.



## Abbreviations

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ACHA	Aboriginal cultural heritage assessment
ACHMP	Aboriginal cultural heritage management plan
AEMR	annual environmental management report
AGE	Australasian Groundwater and Environmental Consultants Pty Ltd
AIP	NSW <i>Aquifer Interference Policy 2012</i>
AHMP	Aboriginal heritage management plan
ANZECC	Australian and New Zealand Environment Conservation Council
AQIA	air quality impact assessment
AQMP	air quality management plan
BBAM	Biobanking Assessment Methodology
BCA	benefit cost analysis
BMP	blast management plan
BOP	biodiversity offset package
BOS	biodiversity offset strategy
CEEC	Critically endangered ecological community
CHPP	coal handling and preparation plant
cm	centimetre
CMA	Catchment Management Authority
CO <sub>2</sub> -e	carbon dioxide equivalent
dB	decibel
DCCEE	Commonwealth Department of Climate Change and Energy Efficiency
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DG	Director-General
DLWC	Department of Land and Water Conservation

DNG	derived native grassland
DPI	Department of Primary Industries
DP&I	Department of Planning and Infrastructure
DTI	Department of Trade and Investment
EA	environmental assessment
EC	electrical conductivity
EEC	Endangered Ecological Community
EMM	EMGA Mitchell McLennan Pty Limited
EPA	Environment Protection Authority
EPL	environment protection license
EP&A Act	<i>NSW Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Commonwealth Environmental Protection and Biodiversity Conservation Act 1999</i>
ESD	ecologically sustainable development
GDE	groundwater dependent ecosystems
GL	gigalitre
ha	hectares
HEL	Hunter Environment Lobby
HMP	heritage management plan
IHAP	Independent hearing and assessment panel
HVAS	high volume air sampler
IEA	International Energy Agency
INP	Industrial Noise Policy
KTP	Key Threatening Process
KL	kilolitre
km	kilometre
km <sup>2</sup>	square kilometre
LGA	local government area

Li	lithium
LMP	landscape management plan
m	metre
M	million
MCO	Moolarben Coal Operations Pty Limited
MCP	Moolarben Coal Project
MGATSIC	Murong Gialinga Aboriginal and Torres Strait Islanders Corporation
Mining Act	NSW <i>Mining Act 1992</i>
ML	mega litre
MLAP	Mudgee Local Aboriginal Land Council
mm	millimetre
MOP	mining operations plan
Mt	million tonnes
Mtpa	million tonnes per annum
MWR	Mid-Western Region
MWRC	Mid-Western Regional Council
NES	national environmental significance
NEW Co	North East Wiradjuri Co. Limited
NMP	noise management plan
NOW	NSW Office of Water
NPWS	National Park and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage
PAC	NSW Planning Assessment Commission
PAD	potential archaeological deposit
PPR	preferred project report
PRP	pollution reduction program

PSNL	project specific noise levels
RAP	registered Aboriginal parties
RMS	Roads and Maritime Services
ROM	run of mine
SEWPaC	Commonwealth Department of Sustainability, Environment, Water, Population and Communities
SSD	State Significant Development
SSI	State Significant Infrastructure
TAS	Todoroski Air Sciences
TEOM	tapered element oscillating microbalances
TSC Act	<i>NSW Threatened Species Conservation Act 1995</i>
TSP	total suspended particulate
TSS	total suspended solids
VPA	voluntary planning agreement
Water Act	<i>NSW Water Act 1912</i>
WMP	water management plan
WRM	WRM Water & Environment
Yancoal	Yancoal Australia Ltd
µS	microsecond

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## Appendix A

### Support submissions

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**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
1 Allen Whye	Mudgee	Economic	MCO has a positive impact on the town of Mudgee and the surrounding community.
		Rehabilitation	MCO holds environmental matters in the highest regard as demonstrated by the neat and tidy site and the effort and pride put into the rehabilitation areas.
		General	Approval of the proposed modification would only prove to be a positive step for all concerned.
2 Breeana Donohoe	NSW	Economic	MCO has had a very positive impact on the community in terms of boosting local employment which should be continued.
3 Bronwyn Patterson	Mudgee	Social	MCO has a positive impact on the community and Mudgee would benefit from the mines extended life.
4 Carrie Gage	Mudgee	General	Supports the proposal.
5 Duncan Gaffney	NSW	Economic	Extension of the life of the mine will give much greater job security in the area.
6 Enda Monaghan	Cooyal	General	Supports the proposed modification.
7 Kate McKittrick	Employee of MCO	Social	Mining benefits the community.
		Social	As an employee of MCO the respondent has a firsthand experience of the level of commitment to the community through the time spent ensuring the safety and wellbeing of employees, and to the continued level of support to local community groups.
		Economic	Businesses such as MCO allow regional towns to continue to prosper.
8 Katrina Wyte	Mudgee	Economic	Without the mining sectors surrounding Mudgee, the town would not continue to grow and prosper.
		Social	Mines bring a diversity of people and opportunities.
		Economic	Financial contributions benefit the developments and charities in the township.
9 Matt Hogden	Pirtek	Economic	MCO is a professional business which supports the local economy and environment.
		General	The proposed modification is beneficial to the district.
10 Narelle Worth	Coolah	General	MCO is a community focused proactive mine.
11 Noel McFarlane	Kara Magnetite	Economic	The respondent values the association with Yancoal as it provides income and employment for contractors in NSW and mine staff at the Kara mine in Tasmania.
		General	MCO is a well run mine with excellent ethics in dealings with contractors and the community.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
12 Shandelle Morros	Employee of MCO	General	The respondent lives 8 km away from the open cut mine and cannot fault anything.
		Social	MCO supports the Ulan community and cares for the community's welfare.
		Social	MCO supports charities, doing fund raising activities and supporting local sporting and community groups.
		Economic	MCO has brought employment to many of the local community members and a flow of money throughout the surrounding towns contracting companies and small businesses.
		General	MCO has a positive impact on the Ulan/Mudgee/Gulgong region in a diverse range of affairs.
13 Wayne Pym	Mudgee	Economic	MCO is a positive member of the Ulan and Mudgee Community, through providing local employment opportunities and supporting local and regional business through suppliers and contractors.
		Social	MCO provides a positive impact on the community spirit of Mudgee through its support of local sporting and community groups and provides much needed support, with both time and money, to local charities and fund raising events.
		General	MCO takes a proactive approach to environmental management and ingrains that into the operation. MCO looks for opportunities to improve process and lessen impacts on the surrounds. MCO has keenly demonstrated that commitment through introducing Duratrays and additional environment support staff.
14 Yonggong Li	Employee of MCO	Economic	MCO actively supports the local economic prosperity of Ulan, Mudgee and the greater MWRC area through direct employment of the mine personnel and indirect employment through suppliers and contractors.
		Rehabilitation	MCO has undertaken proactive rehabilitation activities.
		General	MCO has sound environmental management strategies, with the recent addition of its new fleet of dump trucks of Duratray bodies as the latest example of its endeavour to reduce loading noise level (several million dollars were spent on the Duratray bodies). MCO is the first coal mine in the coal industry that is using the Duratray bodies.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
15 (name withheld)	Gulgong	Economic	MCO supports the economic growth of the greater MWRC area by providing employment to local people as mine personnel or office staff.
		Economic	MCO supports the growth of local businesses by employing their services to meet mine needs and using local contractors to fulfil duties on the mine site.
		Economic	MCO financially contributes to the improvement of local roads and infrastructure.
		Social	MCO supports local services, sporting and community groups, charities and fund raising activities and community events, such the Gulgong Eisteddfod (May 2013) and the Henry Lawson Festival (June long weekend).
		Social	MCO provides community grants and sponsorships as part of its community support program.
		Rehabilitation	MCO is proactive in rehabilitation activities and has sound environmental management strategies.
		General	MCO manages and maintains monitoring of a range of environmental aspects including noise, air quality, blasting and surface and groundwater quality.
		General	MCO completes flora and fauna studies, pre-clearing surveys, stream health monitoring and carries out mine site rehabilitation.
		General	The employees of MCO are a great team of people.
16 (name withheld)	Mudgee	Economic	MCO supports local employment.
		Economic	The future of MCO will affect many people who live in and support the local communities and businesses.
		General	MCO is a professional and productive operation and is committed to minimising its impact on the environment.
		Social	The proposed modification will provide security into the future for many local families in uncertain times.
17 (name withheld)	Mudgee	Economic	MCO provides Mudgee with economic prosperity.
		Economic	MCO is a major contributor of jobs, supports local businesses and generally supports the community as a whole.
		Economic	Mudgee needs mines such as MCP to remain viable and strong to sustain the growth and economic strength within the district.
18 (name withheld)	Mudgee	General	MCO is a responsible miner with an excellent record of environmental compliance, strong support of the local community and a vital employer of local people.
19 (name withheld)	Yarrawonga	Economic	MCO actively supports the economic prosperity of Ulan, Mudgee and the greater MWRC area through the direct employment of mine personnel, support for local charities, community groups, sporting and fund raising.
		Rehabilitation	MCO has sound environmental management strategies and proactive rehabilitation activities.
		Economic	MCO makes an important contribution to roads and infrastructure.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
20 Robert Rice	Mudgee	Economic	MCO provides indirect benefits through employment and support of local businesses and direct benefits by assisting MWRC with infrastructure funding and community donations.
		Rehabilitation	The respondent has seen an improvement in attitude/approach to rehabilitation observed from working within the industry for over 31 years. MCO is a leader in this area, implementing environmental and rehabilitation guidelines and adapting as necessary.
21 Glenn Hyde	Mudgee	Economic	MCO actively supports the economic prosperity of Ulan, Mudgee and the greater MWRC area, through direct employment and regional employment through suppliers and contractors.
		Economic	MCO actively supports the economic prosperity of Ulan, Mudgee and the greater MWRC area, through the support of local businesses by both MCO and all their personnel, support for local services, sporting and community groups, support for charities and fund raising activities in the local region.
		Economic	MCO contributes to local roads and infrastructure.
C22 Adam Lucas	Menah	Social	MCO is committed to supporting the local community in sports, charities and fund raising activities.
		Social	MCO is willing to listen to the community, shown through rehabilitation on site and addressing noise issues.
		General	MCO provides a positive work environment which reflects on the local community.
		Economic	MCO creates direct and regional employment which assists local contractors and businesses.
23 Bruce Birchall	Employee of MCO	General	In its latest modification MCO proposes the safe and ethical recovery of coal.
		General	The coal resource available in the Moolarben seam permits a high yield in relation to its area of disturbance, on land which is low fertile hill country.
		Economic	MCO will financially benefit the vast majority of the local community and NSW.
24 Charmaine Tuck-Lee	Mudgee Cranes	Economic	The respondent shares a successful business relationship with MCO and the proposed modification will continue this business.
25 Dana Willmott	NSW	Economic	MCO actively supports the economic prosperity of the Mudgee area and provides employment for the region.
		Social	MCO supports community groups via donations, the respondent has had personal experience with obtaining donations to support the Mudgee Pony Club.
26 Gregory Bartrim	Service sector	Economic	MCO is a significant employer which is vital to the growth of Mudgee and surrounding districts.
		Social	MCO is active in supporting the local community not just the mining sector.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
27 Ian Russel	Mudgee	Economic	MCO supports local businesses and contractors and considerably boosts the economy in the region.
		Social	MCO supports the community through sponsorship in education, health and safety, sport groups, the environment and arts.
		Rehabilitation	MCO is proactive in rehabilitation activities and has sound environmental management strategies.
		General	MCO employs great people who hold ethical values that positively showcase the region.
28 Jacquelyn Marchant	Mudgee	Social	MCO benefits schools and community groups through donations, partnerships and other initiatives.
29 Lauren Beattie	Kains Flat	Economic	MCO provides employment to a number of people.
		Social	MCO supports charities, local businesses and sporting groups.
30 Paul Rodgers	NSW	Economic	MCO provides employment to the region supporting local business and the community.
		Environmental	The proposed modification will have a far less effect on the environment compared to opening a new mine in the Bylong Valley where agriculture productivity is much greater.
31 Paul Wilks	Mudgee	General	The respondent has shared a respectful business relationship with MCO. MCO's environmental team have high respect for local property owners.
32 Philip Rodgers	NSW	Economic	MCO boosts the economy of Ulan, Mudgee and the greater MWRC area, through direct and regional employment.
		Social	MCO supports the local community through involvement with local services, sporting and community groups, support for charities and fund raising activities.
		Social	MCO contributes to local roads and infrastructure.
		Rehabilitation	MCO undertakes proactive rehabilitation activities, sound environment management strategies and biodiversity offset properties.
33 Rayne Hull	Mudgee	Economic	MCO is a good employer of local people and will continue to support the local community and local businesses if approval is granted.
		Rehabilitation	MCO does great work in the environmental rehabilitation of mining areas.
34 Sam Ritchie	Gulgong	Economic	MCO supports the Ulan, Gulgong, Mudgee and wider communities with employment both directly and indirectly.
		Social	MCO supports local clubs and organisations within the MWRC area.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
35 Scott Mark	Cooyal	Economic	MCO supports the Mudgee and surrounding districts through direct employment and the use of local suppliers and contractors. Indirectly MCO supports local business and services by boosting the local economy.
		Social	MCO contributes to local communities in the form of grants and fundraising activities.
36 Chris Ellery	Training Consultants	Economic	MCO is a major contributor to the economical and social prosperity of the MWRC area.
		General	MCO has been proactive in addressing all environmental, social and infrastructure issues which arise during mining development.
		General	MCO manages its workforce to minimise risks associated with transport to and from work.
		General	Benefits of the proposed modification outweigh any negative issues.
37 Mathew Brackering	NSW	Social	MCO is a valuable asset to the community.
		Economic	MCO's employment is greatly important to the prosperity of the region.
38 Rupert Sheridan	Mudgee	Economic	MCO has provided economic prosperity which supports local trades and businesses.
		General	MCO has helped improve local roads and infrastructure.
39 (name withheld)	Mudgee	Economic	MCO provides financial opportunities for the local community.
40 (name withheld)	Mudgee	Social	MCO supports the local community's activities as well as local businesses and supports charities and fund raising activities.
		Economic	MCO has brought significant amounts of new businesses to the town and supported the growth of the area with its own development.
41 (name withheld)	Mudgee	Economic	MCO provides employment and supports local business in the community.
		Social	MCO actively supports community groups within the region.
		Rehabilitation	MCO is proactive with its rehabilitation program and environmental management.
42 Anthony Furney	Furneys	General	The respondent supports the proposed modification.
43 Baz Lawry	Mudgee	Economic	MCO provides employment for local people and helps boost the economy which is supporting Mudgee's continued growth.
		Social	MCO supports local business, sporting groups and the local council.
44 Casey Deryk	Employee of MCO	General	The respondent supports the proposed modification.
45 Damian Virgona	Mudgee	General	The respondent supports the proposed modification.
46 Dan Hull	Mudgee	Economic	MCO provides local employment opportunities.



**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
47	Darren Gaw	Employee of MCO	Economic MCO provide local jobs and supports local businesses.
48	Geoffrey Bartlett	First National Mudgee	Economic MCO's expansion will provide financial and employment security during times of uncertainty in the local economy.
49	Greg Hart	J.R.R.Richards	Economic MCO provides direct and indirect employment stability to businesses in the region.
			Social MCO contributes to community welfare groups, sporting organisations and fund raising activities.
			Environmental MCO has a sound environmental protection strategy in place and has significant programs that maintain the unique biodiversity of the area.
50	Jim Kennedy	Self employed	Economic MCO creates jobs which in turn supports the current and next generation of the local economy.
			General General statement that coal will be a major source of energy for the foreseeable future.
51	Peter Crawford	Mudgee	Social MCO actively contributes to many charities, sporting organisations, committees & clubs in the local area.
			Rehabilitation MCO has focused much of the mine rehabilitation with water management on site.
52	Peter and Ronda Tudman	Ulan	Environmental The respondent lives within 5 km of the Moolarben mine and feels all environmental activities (eg noise dust and water) are managed well.
53	Sharyn Peterson	Mudgee	Economic MCO actively supports the local and regional economic prosperity through direct and indirect employment.
			Social MCO supports local services, sporting and community groups, charities and fund raising activities.
			General MCO financially contributes to local roads and infrastructure.
54	(name withheld)	Mudgee	Environmental MCO conducts good mining practice exhibited in particular with regard to genuine environmental concerns by residents in the immediate area (eg noise).
			Economic MCO provides continued employment opportunities and flow on benefits for the region.
55	(name withheld)	Mudgee	Social MCO supports the community and donates money to the local community, to various different volunteer and sporting groups.
			Economic MCO employs hundreds of people and brings many contractors to the area which results in a boost in business in the local area.
			Environmental MCO highly considers the surrounding community, evident by the noise testing and noise reduction measures that have been put in place on site.
			Rehabilitation MCO has implemented rehabilitation strategies with positive results shown in a short time.
56	(name withheld)	Gulgong	Economic The mining industry is a large part of employment in the area and MCO contributes to our community.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
57 (name withheld)	Rylestone	Social	MCO has made concerted efforts to assist numerous community projects in the region including schools.
		Economical	The region is becoming increasingly dependent on mining, MCO not only supports the Mudgee community but all the smaller towns and villages in the MWRC boarders.
58 Ben Gardiner	Mudgee	Economical	MCO supports the community through economical growth from all local purchases.
		Social	MCO supports the community through sport and charity fundraisers.
		Rehabilitation	MCO has a great focus on the environment through rehabilitation and sound suppression management.
		General	MCO supports the MWRC with roads and infrastructure.
59 Benjamin Gale	Employee of MCO	Economical	MCO contributes to the local economy through direct employment of mine personnel and also suppliers and contractors.
		Social	MCO donates to charities and sponsors major events and fundraisers in the local community.
		Rehabilitation	MCO undertakes very proactive rehabilitation procedures.
		General	MCO contributes to local roads and infrastructure financially.
60 Bradley Walsh	Mudgee	Economic	MCO provides local employment and supports the local community.
61 Chris Lancaster	Employee of MCO	General	MCO has provided a great benefit to the local region and has operated as a good corporate citizen.
62 Clyntin Perry	Cope	Economic	MCO employs local people which supports the local community and businesses.
		General	MCO is community minded and environmentally conscious.
		Social	MCO's growth will benefit the local area immensely.
63 Darren James	Reliable Conveyor Belt	Economic	MCO provides economic support to the Mudgee and Ulan areas, though both direct employment and use of contractors.
		Economic	The proposed modification will provide financial security for local employees and our company.
64 Jane Munro	Mudgee	Economic	MCO supports the economic prosperity of Ulan, Mudgee and the greater MWRC area through boosting employment and business.
		Social	MCO and its employees support local businesses, sporting and community groups, charities and fund raising activities.
		Rehabilitation	MCO has a high standard of environmental management and implements proactive rehabilitation strategies.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
65 Jeff Parish	Hydraulic Services	Economic	MCO has a commitment to the local Ulan/Mudgee community in the form of local employment and economic prosperity.
		Social	MCO actively support local community groups, charities and fund raising activities.
		General	MCO contributes financially to local infrastructure including roads.
		General	MCO is a responsible corporate company who care for employees.
66 Kristie Jump	Mudgee	General	MCO is community minded and benefit the local area.
67 Ricky Yates	Mudgee	Economic	MCO help the continued growth and expansion of the local community and provide more jobs.
68 Allan Downes	Employee of MCO	Economic	The proposed modification will greatly help the business community of Mudgee with the continual employment of local labour.
69 Annmarie Downes	Mudgee	Economic	The community benefits greatly from MCO from involving local trades and businesses.
70 Cheyne Hanson	Mudgee	General	MCO is highly supportive in every aspect.
71 Luke Sant	Mudgee	Economic	MCO provides jobs for the locals.
72 Stuart Simpson	Double R	General	MCO is a great employer and is very community orientated.
73 (name withheld)	Mudgee	Rehabilitation	The procedure of land rehabilitation including design, reconstruction of waterways, water storage, spreading of mulch/topsoil blend to final seeding of grass covers and trees is excellent.
		Social	MCO is generous to various charities and organisations throughout the MWRC area.
74 (name withheld)	Mudgee	Economic	The proposed modification will increase employment with in the Mudgee region as well as give greater security to the people currently employed at MCO.
75 (name withheld)	Mudgee	General	MCO is professional and committed to the local community.
		Social	MCO donates money to the community, for example the local retirement villages, which benefits them greatly.
76 (name withheld)	Gulgong	Economic	The proposed modification will benefit the region, which relies on the mining industry as a large part of employment.
77 (name withheld)	Gulgong	Social	MCO is a major sponsor for Cancruise which provides health support for local cancer patients. Approval of the modification will allow for continued support.
78 (name withheld)	Mudgee	Economic	MCO has a very positive influence on the local community through direct and indirect employment of personnel and contractors.
		General	MCO supports local community projects and infrastructure and have a strong environmental commitment.
79 Brett Fitzgerald	Mudgee	General	The respondent supports the proposed modification.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
80 Daniel Wood	Mudgee	Social	MCO is an asset to the community and provide sponsorship to local sporting teams.
81 Deon Fisher	Mudgee	Economic	The proposed modification will financially benefit the community.
82 Glen Box	Cudgegong Cruisers	Economic	MCO has generously supported community events and fundraisers.
83 John Hatcher	Ourimbah	General	The respondent supports the proposed modification.
84 Kristie Jump	Mudgee	General	MCO is very community minded and considers the environment.
85 Lisa Gaw	Cook's Gap	General	The respondent supports the proposed modification.
86 Nick Pirie	Mudgee	General	MCO takes measures to ensure minimal impact on the environment and local residents.
87 Ronald Douglas	Mudgee	General	The respondent supports the proposed modification.
88 David Mackander	Collier Creek	Economic	MCO actively supports economic prosperity through the direct employment of mine personnel and regional employment through suppliers and contractors.
		Rehabilitation	MCO undertakes proactive rehabilitation activities with sound environmental management strategies.
		General	MCO financially contributes to local roads and infrastructure.
89 Matt Brigs	Employee of MCO	Economical	The proposed modification will allow for families to survive with the income provided to the area.
		General	The respondent favours working at MCO over other mining companies. MCO and Yancoal have made some major changes to machinery to allow for an environmentally and community friendly mine site.
90 Paul Sharp	Mudgee	Economic	The respondent's family is supported by the mine, if the proposed modification does not go ahead jobs will be lost and local businesses will close.
		Social	MCO donates money toward the hospital.
91 (name withheld)	Mudgee	Economic	MCO supports the respondents business and plays an integral part in employment for local contractors and suppliers and their families in the Mudgee township and surrounding areas.
		Social	MCO actively supports local charities, schools, hospitals and other various organisations.
		Economic	MCO has helped the financial growth of Mudgee.
92 (name withheld)	Ingleside	General	MCO has a great environmental commitment.
93 (name withheld)	Gulgong	Economic	The proposed modification will secure further long term growth and employment in the area.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
94 (name withheld)	Gulgong	Economic	Continuation of MCO's growth will secure employment into the future for many people in the community.
		Social	MCO donates greatly across different community areas and without the approval for the proposed modification this will cease to occur.
95 (name withheld)	Mudgee	Economic	MCO actively supports the MWRC through direct and indirect employment. The long term prosperity of the region is influenced by the company's ongoing success.
		Social	MCO provides sponsorship of various community groups.
96 (name withheld)	Muswellbrook	Economic	MCO is a beneficial employer to the local area as well as outside of the local area. The proposed modification will greatly benefit the local economy.
97 (name withheld)	Mudgee	Economic	The proposed modification will help keep the community strong by providing jobs and financial security in the Ulan district.
		General	Mining in the Ulan seam has been going on now since the early 1900's and the community has more to gain than to lose from the proposed modification.
98 Brendan Kiley	Mudgee	Social	MCO is an important part of the community and provides valuable investment in the Mudgee community. The proposed modification will have a greater positive impact on the community.
99 Brett Lavaring	Enigma	Economic	MCO provides crucial economic support to the greater MWRC area, through employment of local work force and support to local businesses and contractors.
		Social	MCO provides significant financial community support, funding important grassroots projects.
		General	MCO is active in its commitment to upholding environmental practices and taking initiatives to improve environmental management strategies.
100 Catherine Anderson	Employee of MCO	Economic	The MWRC has a rich mining history and should continue to benefit both directly and indirectly as a result of the proposed modification. This employment boosts the local economy and town development. The proposed modification will ensure the area's economic viability for years to come.
		General	MCO strongly emphasises the importance of safety in its day to day running. MCO's approval will support safe mining.
101 Kayla Innes	Mudgee	Economic	The proposed modification will increase local employment and boost the local economy.
		Rehabilitation	MCO has little environmental impact as its rehabilitation strategies follow strict laws regarding environmental care.
102 Kayla Kiley	Mudgee	Economic	The proposed modification will help Mudgee and surrounding communities to continue to grow and prosper.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
103 Mark Smith	Newcastle	Economic	The environmental impacts and risks associated with the proposed modification are minimal and the benefits to the community and economy are significant. MCO's expansion is critical for younger people and employment security.
104 Ryan Gomez	Yancoal	Economic	MCO employs locals.
		Economic	The proposed modification will cause increased employment opportunities and benefit the community.
105 Steven Moylan	Maitland	General	The long term benefits to the employees, local community, supporting industries, and the state of NSW are significant and are far too important to ignore.
106 Trevor Adams	Employee of MCO	Economic	MCO provides employment to local and out of the area contractors.
		Economic	The MCP contributes greatly to the economy.
		Social	MCO donates large amounts of money to local charities and community organisations.
107 Chris Swarbrick	Metro Hydraulics	Economic	The respondent has a great business relationship with MCO and the proposed modification will be of great benefit to the region and to Metro Hydraulics.
108 Corey Dunk	Gulgong	General	MCO supports the community.
109 (name withheld)	Mudgee	Economic	MCO is a significant contributor to Mudgee's economy and should be supported.
110 (name withheld)	Mudgee	Economic	MCO provides jobs within the community, both on site and within the surrounding towns.
111 (name withheld)	Mudgee	Economic	The proposed modification will boost the economy within the region.
112 (name withheld)	Gulgong	Environmental	MCO has a very active environmental and operations department that responsively monitors and manages environmental compliance.
		General	The proposed modification does not impose on land of any significant value for agriculture or any other cultural use.
		Rehabilitation	MCO has an excellent proactive rehabilitation program for mined land rehabilitation.
		Economic	The mine provides employment for locals and the approval will provide financial security for those involved.
113 (name withheld)	Employee of MCO	Social	MCO has provided great support to schools in Mudgee and surrounding areas. They support many local volunteer groups through fund raising and donations.
		Economic	MCO employs a balanced work force consisting of many locals which helps the local economy.
		Rehabilitation	MCO is passionate about quickly rehabilitating the land after it has been mined to return a biodiverse environment to the site.

**Table A.1 Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	
114 D Endacott	Mudgee	Economic	MCO does great things for MWRC area by supporting contractors, local businesses and community groups.
		Rehabilitation	MCO spends lots of money on rehabilitation.
115 David English	Minespex	Economic	MCO is a key financial contributor to the MWRC area.
		Economic	The proposed modification will support local employment during a time when the economic climate is showing signs of stress.
		General	The proposed modification will extract coal that would otherwise be sterilised. MCO is committed to managing the broader land such as with weed and pest control.
		Rehabilitation	MCO has demonstrated a positive and proactive commitment to rehabilitation with positive on ground environmental results.
116 Ian Colley	Earthmoving	General	The proposed modification will help the project run more efficiently and effectively causing minimal impact on the surrounding environment.
		Social	MCO has a positive impact in the MWRC area by providing employment to locals and supporting community initiatives and fundraising events.
117 Ken Harding	Mudgee	Economic	Mining has brought many benefits to Mudgee over the years. The proposed modification will strengthen a large number of associated businesses and support Mudgee's growth.
118 (name withheld)	Mudgee	Economic	The respondent's family is supported by MCO and can maintain living as a family in Mudgee because of this support.
		General	MCO has provided funding to improve infrastructure in the area. Extending the mines life will better improve Mudgee.
119 Grant Gjessing	Strait Up Services	Economic	Small businesses in the area rely on the continued prosperity of local mines.
		Economic	MCO is economically beneficial to the community and local businesses.
		Social	MCO actively supports local charities, sporting and community groups, including vital support for the Mudgee District Hospital.
		Social	MCO has distributed over \$250,000 in community grants and sponsorships as part of their community support program.
		General	MCO staff are respected members of the community here in Mudgee due to the consultative nature of the way they carry out business.
120 Amy Hugget	Mudgee	As per submission 20	As per submission 20
121 Daniel Boal	Cook's Gap	As per submission 20	As per submission 20

**Table A.1**      **Summary of support submissions**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>
122 Ryan Goodlet	Mudgee	As per submission 20 As per submission 20
123 Jane Wasson	Mudgee	As per submission 20 As per submission 20
124 Jason Hampton	Mudgee	As per submission 20 As per submission 20
125 Kelly Boal	Cook's Gap	As per submission 20 As per submission 20
126 Grant Walsh	Mudgee	As per submission 20 As per submission 20
127 David Walsh	Mudgee	As per submission 20 As per submission 20
128 Sharni Linke	Mudgee	As per submission 20 As per submission 20
129 Steven Wilson	Mudgee	As per submission 20 As per submission 20
130 Allan Wiseman	Mudgee	As per submission 20 As per submission 20
131 Kerry Walsh	Mudgee	As per submission 20 As per submission 20
132 Sam Wright	Mudgee	As per submission 20 As per submission 20
133 Ged McDonald	Mudgee	As per submission 20 As per submission 20
134 Helen Events	Mudgee	As per submission 20 As per submission 20
135 Julie Sodler	Mudgee	As per submission 20 As per submission 20
136 Glenn Grossford	Mudgee	As per submission 20 As per submission 20
137 Rodney Smart	Mudgee	As per submission 20 As per submission 20



## Appendix B

### Community and special interest submissions

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**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
<b>Special interest groups</b>				
Hunter Environment Lobby Inc.	East Maitland	S1.1 Cumulative effects	Cumulative impacts on the Goulburn River, biodiversity, amenity, community, Aboriginal cultural heritage and increased greenhouse gas emissions - cumulative impacts not accurately assessed in relation to Wilpinjong Coal Mine and Ulan Coal Mine as modified.	4.1, 5.9, 7.2.3, 8.4 and 8.5
		S1.2 Proposed modification	The increase in the footprint of the currently approved Open Cut 1 and Open Cut 2 by 25% is a significant enlargement of approved operations and will generate a significant impact on the surrounding environment and community.	8.2
		S1.3 Noise and air quality	The proposal to remove ridgelines at a height of 100 m, 60 m and 30 m has not been adequately assessed for noise and dust levels at those heights in the surrounding landscape. Impacts on Ridge Road and Cook's Gap residents have been vastly understated.	6.1
		S1.4 Water	Assessment notes that the whole mine operation will have a daily water demand of 6.9 ML/day and an annual requirement of 2,520 ML/year. There has been no assessment of the cumulative loss of water to the Upper Goulburn River catchment from the combined interception and use of water by Wilpinjong and Ulan Coal Mines and all proposed stages of the MCP.	3.4 and 4.1
		S1.5 Water	Cumulative impacts on water volume and quality in the Goulburn River have not been adequately assessed.	4.1
		S1.6 Surface water	MCO has proven to be unable to operate under current conditions of approval and has caused major pollution incidents in the Goulburn River.	3.4
		S1.7 Assessment and approvals process	No further impacts on baseflows and surface flows should be considered until an independent regional water study is conducted on the current cumulative impacts of the three mining operations in the Upper Goulburn River water source.	4.4 and 8.12
		S1.8 Economic	Cost benefit analysis does not consider the ongoing decline of water quantity and quality in the Upper Goulburn River, which is impacting on downstream river ecology and other water users.	8.10

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Respondent	Location when provided	Issue	Addressed	
	S1.9	Economic	The predicted local, regional and national benefits of the proposal have not accurately assessed the long term costs to the health of the river system and impacts on downstream water users.	8.10
	S1.10	Ecology	The additional destruction of 171.4 ha of native forest and woodland vegetation communities will result in a major cumulative loss of high conservation value vegetation in the region, particularly the loss of 16.5 ha of the critically endangered White Box Yellow Box Blakely's Red Gum Grassy Woodland and Derived Native Grassland.	5.4
	S1.11	Ecology	When considered with the cumulative area of currently approved vegetation removal from the regional landscape, the proposed biodiversity offset package will not replace the loss of mature features such as tree hollows and mixed aged vegetation, or the destruction of intact CEEC.	5.9
	S1.12	Rehabilitation	The loss of ridgeline vegetation and associated landscape habitat features such as rock shelters and crevices will not be replaced in proposed mine rehabilitation.	8.7
	S1.13	Ecology	Fauna survey inadequate - recording of only two threatened species in a landscape where all other previous surveys have recorded a broad range of fauna species is an indication of poor effort and methodology.	5.2
	S1.14	Ecology	Impacts of open cut mining operations on adjacent native species habitat have not been adequately assessed, particularly in the neighbourhood national estate areas of the Goulburn River National Park and Munghorn Gap Nature Reserve.	5.2 and 5.7
	S1.15	Economic	The cost of the impacts of open cut mining on adjacent native species has not been adequately assessed.	8.10
	S1.16	Heritage	The cumulative loss of Aboriginal cultural heritage sites has not been considered.	8.6
	S1.17	Greenhouse gases	27 million tonnes of greenhouse gas emissions is not insignificant and the assessment fails to present this as a percentage of NSW emissions. Increase in carbon emissions will cause significant costly environmental damage through enhanced climate change impacts.	7.2.1, 7.2.2
	S1.18	Economic	Impacts have not been adequately assessed in the economic analysis of the proposal.	8.10

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<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	<b>Addressed</b>	
Rylstone District Environment Society Inc.	Rylstone	S2.1 Ecology	The proposal involves clearing additional woodland vegetation, part of an endangered ecological community which is listed for protection.	5.4
		S2.2 Surface water	Open cut pits and overburden from the mine will be close to Moolarben Creek, which threatens water quality in the Goulburn River.	3.2
		S2.3 Surface water	Provisions for managing water quality in the Goulburn River are not adequate.	3.2
		S2.4 Groundwater	The proposal threatens The Drip in the Goulburn River National Park, and the site should be protected.	4.3
Nature Conservation Council of NSW	Newtown	S3.1 Assessment and approvals process	Given the scale of the modification concern that no DGRs were provided.	8.12
		S3.2 Assessment and approvals process	Concern that the proposal was submitted prior to determination of Stage 2.	8.12
		S3.3 Cumulative effects	Refer to S1.2	8.2
		S3.4 Water	Refer to S1.4 and S1.5	3.4 and 4.1
		S3.5 Ecology	Cumulative impacts not identified for loss of CEEC; limiting habitat features including hollow bearing trees and rocky outcrops; habitat for threatened woodland birds, including Regent Honeyeater, Turquoise Parrot, Diamond Firetrap; Brown Treecreeper; Powerful Owl and Masked Owl; and habitats of threatened microbats.	5.7
		S3.6 Water	Cumulative impacts on health and ecology of the Goulburn River.	4.1 and 5.7
		S3.7 Ecology	Continued destruction of the ridgeline vegetation is unacceptable.	5.4
		S3.8 Noise and air quality	Removal of ridgeline would have a significant impact on local microclimate.	6.1 and 7.1.2
		S3.9 Noise	Potential cumulative noise impacts not adequately assessed.	6.3
		S3.10 Air quality	Potential cumulative air quality impacts not adequately assessed.	7.1.1
		S3.11 Surface water	Potential cumulative impacts on water pollution not adequately assessed.	4.1
		S3.12 Heritage	Objects to impact on 33 Aboriginal heritage sites. Assessment judges all sites to be of low significance without completing full suite of archaeological work required to identify significant features, particularly PADs in rock shelters.	8.6
		S3.13 Heritage	Refer to S1.16	8.6

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
		S3.14 Economic	Assessment is inadequate. Independent assessment that fully considers the long-term costs of the modification, particularly long-term costs to local community from increased drought, bushfire and extreme storm events should be undertaken.	8.10
		S3.15 Greenhouse gases	Refer to S1.17	7.2.1
		S3.16 Ecology	Disagrees that the BOS will adequately replace the loss of good-condition habitat, CEEC, significant landscape features and Aboriginal cultural heritage sites.	5.9
		S3.17 Groundwater	Refer to S2.4	4.3
		S3.18 Assessment and approvals process	Proposal inconsistent with principles of ESD and will cause significant intergenerational impacts.	8.1
Central West Environment Council	Wollar	S4.1 General	General objection to the ninth modification to this very large, destructive and poorly managed mining operation.	8.2
		S4.2 Assessment and approvals process	DP&I has not adequately considered the cumulative impacts of the current operations at Moolarben when combined with the impacts of the Wilpinjong and Ulan operations - demonstrated through drawn out process of negotiation around the upgrade of Cassilis Road.	8.12
		S4.3 Assessment and approvals process	The continued dependence of DP&I on information supplied by consultants employed by the mining industry has led to a number of major negative cumulative impacts in the Ulan region.	8.12
		S4.4 Assessment and approvals process	No confidence in the quality of the information supplied in the EA.	8.12
		S4.5 Assessment and approvals process	DP&I did not issue Director General's Requirements for the assessment of the proposal and gave the community only fourteen days to respond to the public exhibition.	8.12
		S4.6 Proposed modification	25% increase in the current approved disturbance area to access a further 30 million tonnes of coal is a significant extension.	8.2
		S4.7 Groundwater	Refer to N2.4	4.3
		S4.8 Ecology	Regional scale cumulative impacts on biodiversity through the loss of a further 171.4 ha of forest and woodland vegetation including CEEC and an identified significant impact on at least two threatened fauna species.	5.7

**Table B.1** Summary of community and special interest submissions and responses

Respondent	Location when provided	Issue	Addressed	
	S4.9	Ecology	The proposed biodiversity offset package will not adequately compensate for the cumulative loss of habitat in the region and the poor biodiversity offset arrangements previously approved for broad-scale clearing activities.	5.9
	S4.10	Greenhouse gases	The proposed increase of 27,434,059 tonnes of CO <sub>2</sub> -e per year is not acceptable and cannot be mitigated. The economic assessment of the proposal has not provided a calculation of the negative economic impacts of climate change on the local and regional economy.	7.2.2
	S4.11	Groundwater	Refer to N1.5	4.1
	S4.12	Surface water	NSW Planning and NSW Office of Water are abrogating their responsibility to the long term health of a major tributary to the Hunter River system if they consider this proposal before commissioning an independent regional water study on the current impacts of open cut and longwall mining operations on the Upper Goulburn River water source - this study should consider all current conditions of approval for the Ulan, Moolarben and Wilpinjong projects, the effectiveness of current environmental pollution licences and the ability of the projects to operate within these regulations.	4.4 and 8.12
	S4.13	Ecology	Further destruction of areas of good condition native vegetation particularly those containing remnants of the Grassy Box Gum Woodland CEEC.	5.4
	S4.14	Ecology	The cumulative loss of threatened species habitat in the Ulan-Wollar area due to approvals for broad-scale clearing for large open cut mining operations is not being adequately assessed or addressed. The proposal does not identify that large areas of good condition mature CEEC have already been destroyed by mining activities.	5.7
	S4.15	Ecology	Concerned that with a maximum of only 8 hours of diurnal bird survey effort for the proposal assessment, 53 diurnally active birds were recorded, including a number of regionally significant woodland birds.	5.2
	S4.16	Ecology	Significant birds recorded in habitat proposed to be destroyed include the Common Koel, Emu, Jacky Winter, Eastern Yellow Robin, Rufous Whistler and the threatened Turquoise Parrot, Diamond Firetail, Brown Treecreeper, Powerful Owl and Masked Owl.	5.4

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
	S4.17	Ecology	The habitat has the potential to be used by other threatened species such as the Barking Owl and Regent Honeyeater.	5.4
	S4.18	Ecology	A more thorough survey effort would more than likely record a greater number of threatened and regionally significant birds in the good condition habitat threatened with destruction.	5.2
	S4.19	Ecology	Concerned that the acknowledged significant threat to the Brown Treecreeper and Eastern Cave Bat, through cumulative loss of irreplaceable tree hollows and rocky outcrops, is not a complete indication of the extent of the threatened species impacts because of the poor survey effort.	5.4
	S4.20	Ecology	The ongoing loss of good quality habitat around the edges of the Munghorn Gap Nature Reserve and Goulburn River National Park will increase the pressure on existing populations and competition for threatened species habitat within the reserves, which is not addressed.	5.7 and 5.10
	S4.21	Ecology	The description of the size of the reserves in relation to the additional area identified for removal is not relevant. A comparison of the cumulative loss of significant and limiting habitat features such as hollow bearing trees and rocky outcrops in the region would be a more robust indication of cumulative impact on threatened species.	5.9
	S4.22	Ecology	The diversity of fauna species recorded in the area is significant and should be a strong justification for not approving the proposal.	5.4
	S4.23	Ecology	Does not support the conclusion that increased indirect impacts such as noise, dust, fragmentation, edge effects, connectivity and impacts to conservation reserves are not significant. The cumulative impact of the current three large mining operations in the region has not been addressed.	5.7
	S4.24	Ecology	The proposed modification is in contravention to the principles of the EPBC approval for Moolarben Stage 1.	5.10
	S4.25	Ecology	Seeks clarification to the proposed offset of the White Box Yellow Box Blakely's Red Bum Woodland, which is considered to be inconsistently applied and inadequate when compared to ratios applied to clearing for agricultural purposes.	5.9
	S4.26	Visual	Does not support the claim that the removal of three ridgelines up to a height of 100 m can be adequately screened by planting trees. The impact from current operations at MCO on visual amenity is extreme and cannot be mitigated.	8.5



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Respondent	Location when provided	Issue		Addressed
		S4.27 Air quality	Increased dust emissions from ridgeline removal have not been adequately assessed in relation to impacts on neighbouring properties in the Ridge Road and Cook's Gap area.	7.1.2
		S4.28 Noise	Increased noise impacts from ridgeline removal have not been adequately assessed in relation to impacts on neighbouring properties in the Ridge Road and Cook's Gap area.	6.1, 6.2
		S4.29 Noise and air quality	Concerned that the predictions of the impacts of the current operations were vastly understated.	7.1.1
		S4.30 Assessment and approvals process	DP&I must commission an independent assessment of noise, dust and environmental amenity impacts of the proposal to be conducted by a firm of consultants that have no history of working for the coal industry.	8.12
		S4.31 Surface water	Cumulative impacts on the health of the Upper Goulburn water source caused by the Ulan Continued Operations, MCP Stage 1 and Stage 2 and the Wilpinjong Coal Mine operations not adequately assessed.	5.7
		S4.32 Surface water	The proposal to dump mine overburden within 100 m of the Moolarben Creek tributary is not acceptable. This will cause an increase in sedimentation from runoff, particularly in extreme rainfall events.	3.2
		S4.33 Surface water	The current increase in sedimentation in the Goulburn River caused by mining operations has not been adequately assessed.	3.2
		S4.34 Surface water	The WMP will not protect the river ecology from ongoing increased pollution events.	3.4
		S4.35 Groundwater	The interception of baseflows and surface flows from current mining operations is significant and cannot be mitigated through the purchase of downstream water licences.	3.2
Dan Clifford of Xstrata Coal)	Ulan Coal Mines Pty Limited (UCML)	S5.1 General	Approximately 2.3 ha of UCML owned land within the proposed extension area is not currently subject to a mining lease. Until the extent of the proposed modification is confirmed, UCML objects to the proposed modification.	8.12

**Table B.1** Summary of community and special interest submissions and responses

Respondent	Location when provided	Issue		Addressed
	S5.2	Noise	Notes that a noise model validation has not been completed as part of the noise assessment. Xstrata has received specialist noise advice that validation of the noise model would provide increased confidence in the EA's noise predictions, which not suitably managed have the potential to have a cumulative impact upon UCML's approved operations. Xstrata requests that validation modelling be carried out to compare the proposed modification noise model prediction with the measured values and with predictions made for the Stage 2 PPR.	6.1 and 6.5
	S5.3	Air quality	Difficult to assess air quality impacts of the proposed modification in isolation, as the emission estimation and dispersion modelling includes both the approved Stage 1 and proposed Stage 2 operations. As such, the specific air quality contributions of the proposed modification to the approved MCP operation along with any associated potential cumulative impact are not certain. Xstrata notes a significant number of receptors to the west of the MCP that were assessed in Ulan Continued Operations (EA) 2009 but not for the proposed modification. The contour plots, particularly 24-hour average PM <sub>10</sub> concentrations from the proposed modification indicate a potential for impacts at these receptors higher than predicted due to UCML's operations. Xstrata requests additional consideration be given to properties west of MCO's operations to consider in the proposed modification has the potential to result in cumulative air quality impacts.	7.11
	S5.4	Surface water	Any change to MCO's water management system must not impact upon UCML's ability to carry out licensed discharge accordance with the requirements of EPL 394.	3.4
	S5.5	General	Requests acknowledgement of the requirement to maintain access through the proposed offset properties to the northern part of the UCML project approval area.	5.9
	S5.6	Proposed modification	Figure ES.1 and Figure 1.1 do not depict the correct UCML project approval boundary, whilst figure ES.3 and Figure 10.3 do not display all of UCML's Biodiversity Offset Areas.	2.4

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Respondent	Location when provided	Issue	Addressed	
<b>Community</b>				
Deidre Olofsson	Camberwell	C1.1 Groundwater	The Drip requires government protection given its significance to community and potential economic benefits through another industry which is sustainable	4.3
		C1.2 Proposed modification	No terms of reference for EA which has a significant bearing on the assessment related EIS and mitigation.	8.12
		C1.3 Groundwater	Migration of salinity within spoils and the speed it travels to the void and aquifers becoming saline.	4.4
		C1.4 Rehabilitation	Costs associated with post mining rehabilitation impacting tax payer - cost of maintenance of rehabilitation area including final voids - must be sufficient to support ongoing costs when the land is handed back to the State.	8.7
		C1.5 Noise	Cumulative blasting impacts - questions how this is policed (how many per day/year).	6.4
Maureen Boller	Lue	C2.1 Surface water	Refer to S1.6	3.4
		C2.2 Cumulative effects	Mining has led to population reductions in rural communities.	8.4
		C2.3 Cumulative effects	Depopulation has led to a severe reduction in small rural schools such as Wollar and Ulan. This threatens the viability of these schools which are an integral part of the local communities.	8.4
		C2.4 General	A reduction in agricultural production adversely impacts rural suppliers and local businesses.	8.4 and 8.11
Ian McAdam	Mudgee	C3.1 Surface water	Refer to S1.6	3.4
		C3.2 Ecology	Clearing of woodland, including communities protected by state and federal law.	5.4
		C3.3 Greenhouse gas	Extraction will result in more coal being burned and this is the major cause of climate change and related adverse environmental impacts including significant sea level rise.	7.2.2
		C3.4 Water	Expansion will impact underground and surface water in the region.	3.2 and 4.4
		C3.5 Groundwater	Refer to S2.4	4.3
		C3.6 General	Extraction of coal should cease due to impacts on the environment.	8.4
Sara Fergusen	Dunedoo	C4.1 Health	Current mining detrimental to the health of communities.	8.8
		C4.2 General	Current mining impacts on the environment generally.	8.4

**Table B.1 Summary of community and special interest submissions and responses**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	<b>Addressed</b>	
Ken and Amanda Berry	Scone	C5.1 Proposed modification	Refer to S1.2	8.2
		C5.2 Proposed modification	The proposed modification will extend the existing mine footprint by 25% and will disturb an additional 178 ha, creating a super pit measuring 886 ha.	8.2
		C5.3 Greenhouse gases	Proposed extension to mine life to extract 6 Mtpa coal will cause continued unsustainable environmental disruption and increased GHG emissions.	7.2.3
		C5.4 Ecology	Removal of sandstone ridgeline habitat is unacceptable.	5.4
		C5.5 Noise	General increase in noise impacts from extension to mining.	6.2
		C5.6 Air quality	General increase in dust impacts from extension to mining.	7.1.2
		C5.7 Ecology	Extension will clear 171.4 ha of woodland, including threatened vegetation communities. This is in addition to the 416.8 ha of native vegetation already approved for disturbance under MCP Stage 1.	5.4
		C5.8 Surface water	Threat to water quality from sediment and salinity discharge into the headwaters of Goulburn Creek due to close proximity of mining areas to the Moolarben Creek.	3.2
		C5.9 Surface water	The proposed water management plan suspends the protection of water quality.	3.4
		C5.10 Surface water	Increased disturbance area will intercept additional overland and baseflows to the Goulburn River.	3.3
		C5.11 Groundwater	The 'Drip' must be protected within the Goulburn River National Park. This is a unique and magnificent area.	4.3
The Reverend Mandy Wheatley	Merriwa	C6.1 Ecology	Removal of nearly 200 ha of woodland, ridgeline and other animal life.	5.4
		C6.2 Social	General disturbances to the local community.	8.4
		C6.3 Groundwater	Refer to S2.4	4.3
Deirdre Franklin	Mudgee	C7.1 Surface water	Refer to S1.6	3.4
		C7.2 Social	Protection of local community, school, birds, animals, trees, water etc.	8.4
Mary Twidell	Horinghold	C8.1 Proposed modification	Refer to S1.2	8.2
		C8.2 Visual	Catastrophic from a visual perspective.	8.5
		C8.3 Ecology	Loss of woodland including native forest is irresponsible.	5.4
		C8.4 Greenhouse gases	Refer to C9.7	7.2.2

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Respondent	Location when provided	Issue	Addressed
		C8.5 General	Australia has a wealth of natural resources that can be used to ensure sustainability. 8.3
Marg McLean (Falbrook Wildlife Refuge)	Singleton	C9.1 Economic	Justification relates only to financial gain. Price of coal plummeting, cost to environment increasing. 8.10
		C9.2 Groundwater	Depletion of groundwater. 4.4
		C9.3 Air quality	Refer to C5.6 7.1.2
		C9.4 Surface water	Negative impact on water quality and quantity. 3.2 and 3.3
		C9.5 Ecology	Negative impact on biodiversity conservation. 5.9
		C9.6 Ecology	Ability to support threatened species. 5.4
		C9.7 Greenhouse gases	Coal should remain extant to minimise GHG emissions and global temperature rises. 7.2.2
		C9.8 Ecology	Construction of mega pit, in the headwaters of the Goulburn River fails on ecological grounds. 5.4
		C9.9 Ecology	Importance of linkage between Munghorn Gap Nature Reserve and Goulburn River National Park to be conserved. Clearing of CEEC should not be approved. 5.5
		C9.10 Assessment and approvals process	Recent Warkworth decision should provide essential guidance to the DP&I regarding the 'public interest'. 8.12
Diane O'Mara	Gulgong	C10.1 Proposed modification	Refer to S1.2 and C5.2 8.2
		C10.2 Ecology	Refer to C5.4 and C5.7 5.4
		C10.3 Surface water	Increased impacts to surface water systems. 3.2
		C10.4 Surface water	Refer to C5.8 3.2
		C10.5 Groundwater	Increased impacts to groundwater systems. 4.4
		C10.6 Groundwater	Refer to S2.4 4.3
		C10.7 Surface water	Refer to S1.6 3.4
		C10.8 Air quality	Refer to C5.6 7.1.2
		C10.9 Noise	Refer to C5.5 6.2
		C10.10 Transport	Increased traffic and trains. 8.9
		C10.11 Greenhouse gases	Unacceptable to extend the life of the mine in terms of climate change. 7.2.3

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Respondent	Location when provided	Issue	Addressed	
Bev Atkinson	Scone	C11.1 Groundwater	Refer to S2.4	4.3
		C11.2 Ecology	Clearing of ridgeline vegetation is unacceptable.	5.4
		C11.3 Rehabilitation	Questions the long term solution for remediation of approved mining areas.	8.7
		C11.4 Greenhouse gases	Refer to C9.7	7.2.2
		C11.5 Cumulative effects	General statement on cumulative effects of the MCP and its neighbouring mines.	8.4
Anka Peters and Michael Cleary	Grattai	C12.1 Social	Mudgee district being destroyed by large mining projects.	8.4
		C12.2 Groundwater	Damage to fragile underground water systems.	4.4
		C12.3 General	General statement that Australia can survive without money from mines.	8.10
Barrie Griffiths (North East Forest Alliance)	-	C13.1 Greenhouse gases	Refer to C3.3	7.2.2
		C13.2 Assessment and approvals process	Proposal inconsistent with the objects of the EP&A Act, including protection of remnant native vegetation, threatened species, water and catchment values, ESD principles and inter-generational equity.	8.1 and 8.12
		C13.3 Assessment and approvals process	Proposal would be inconsistent with Commonwealth legislation, and strategies binding on State Government and international obligations.	8.12
		C13.4 Assessment and approvals process	Proposal cannot be conditioned to achieve acceptability.	8.12
		C13.5 Assessment and approvals process	Object to tokenistic assessment and approvals process.	8.12
		C13.6 Ecology	Cumulative loss of CEEC, species habitat and likely loss of the Brown Treecreeper together with previous losses.	5.7
		C13.7 General	Government must look to energy sources beyond coal and coal seam gas.	8.3
Wendy Wales	Muswellbrook	C14.1 Proposed modification	Refer to C5.2	8.2
		C14.2 Greenhouse gases	Refer to C10.11	7.2.3
		C14.3 Ecology	Further loss of protected ecological communities.	5.4
		C14.4 Surface water	Increased impact to the Goulburn River (eg salt, gouging floods, groundwater interference and sediment).	3.2
		C14.5 Groundwater	Refer to S2.4	4.3
		C14.6 Surface water	Refer to S1.6	3.4

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Craig Chapman	Jerrys Plains	C15.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C15.2 Greenhouse gases	Refer to C5.3	7.2.3
		C15.3 Ecology	Refer to C5.4 and C5.7	5.4
		C15.4 Noise	Refer to C5.5	6.2
		C15.5 Air quality	Refer to C5.6	7.1.2
		C15.6 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C15.7 Groundwater	Refer to S2.4	4.3
		C15.8 Cumulative effects	Cumulative effects must be considered not just mines in isolation.	8.4
		C15.9 Ecology	Impacts on ecology from the clearance of 178 ha of land, including CEECs and two threatened species, namely, Eastern Cave Bat and Brown Treecreeper.	5.4
		C15.10 Surface water	Refer to S1.6	3.4
Phyllis Setchell	Mudgee	C16.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C16.2 Greenhouse gases	Refer to C5.3	7.2.3
		C16.3 Ecology	Refer to C5.4 and C5.7	5.4
		C16.4 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C16.5 Groundwater	Refer to S2.4	4.3
		C16.6 Noise	Refer to C5.5	6.2
		C16.7 Air quality	Refer to C5.6	7.1.2
		C16.8 Surface water	Refer to S1.6	3.4
Lyn Coombe	Lue	C17.1 Proposed modification	Refer to S1.2	8.2
		C17.2 Ecology	Refer to C5.4 and C5.7	5.4
		C17.3 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C17.4 Groundwater	Refer to S2.4	4.3
		C17.5 Noise	Refer to C5.5	6.2
		C17.6 Air quality	Refer to C5.6	7.1.2
		C17.7 Transport	Refer to C10.10	8.9
		C17.8 Health	Health will be at risk, stress causing increased mental health problems.	8.8

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Respondent	Location when provided	Issue	Addressed	
E P Finnie		C18.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C18.2 General	Refer to C5.3	7.2.3
		C18.3 Noise	Refer to C5.5	6.2
		C18.4 Air quality	Refer to C5.6	7.1.2
		C18.5 Ecology	Refer to C5.4 and C5.7	5.4
		C18.6 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C18.7 Groundwater	Refer to S2.4	4.3
Bev Smiles	Wollar	C19.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C19.2 Surface water	Refer to S1.6	3.4
		C19.3 General	There does not appear to be any attempt by Yancoal to progress the approved longwall mining operation.	3.4 and 8.3
		C19.4 Greenhouse gases	Refer to C9.7	7.2.2
		C19.5 Noise	Refer to C5.5	6.2
		C19.6 Air quality	Refer to C5.6	7.1.2
		C19.7 Ecology	Refer to C5.4 and C5.7	5.4
		C19.8 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C19.9 Groundwater	Refer to S2.4	4.3
		C19.10 Water	Objection to the executive summary statement 'potential impacts on water resources are negligible and amenity impacts minor, with no additional privately-owned residences predicted to be subject to acquisition upon request'.	3.1, 6.1 and 7.1.1
		C19.11 Visual	Removal of ridge-lines at heights of 100 m down to 30 m is a major impact on the local landscape and amenity. All three proposed ridge-line excavations are visible from multiple points in the landscape and face the densely populated Ridge Road and Cook's Gap community.	8.5
		C19.12 Noise and air quality	Communities already impacted by Stage 1 to a greater extent than predicted. No confidence that the assessment for proposal is more accurate. The noise and dust modelling used to predict 'no impact' have been proven to be inadequate for the mine.	6.1 and 7.1.1



**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
		C19.13 Surface water	The proposal to join Open Cuts 1 and 2 limits opportunities for clean water diversion and water management around the disturbed area thus increasing the interception and loss of catchment runoff and increasing the volume of contaminated water across the site.	3.4
		C19.14 Surface water	Sediment or mine water dam overflows or offsite discharges will impact downstream ecology and water quality of Goulburn River.	3.4
		C19.15 Water	The cumulative loss of flows to the river system has not been adequately assessed. Ulan Coal Mine intercepted 4,355 ML during 2011/12. The predicted additional interception of 1,304 ML/year from the proposal will result in almost 6 GL of water being intercepted by mining from the groundwaters and surface waters associated with the Goulburn River.	4.1
		C19.16 Water	Ecological impact and loss of water volume and quality available to other users in the Goulburn River system has not been adequately considered by the NSW Government.	3.2, 3.3 and 5.7
		C19.17 Water	DP&I and NSW Office of Water should investigate an independent regional water study of the impacts of mining on the Upper Goulburn River. This is based on ongoing community requests.	8.12
		C19.18 Surface water	The Goulburn River has been subject to significant changes to the river hydrology, including natural flow variability, water quality and sedimentation.	3.2, and 3.3
		C19.19 Surface water	The proposal to suspend the EPL for five consecutive days of rainfall over 44 mm is completely unacceptable and should not be considered. These types of rainfall events occur on average 3 or 4 times per year in the catchment.	3.4
		C19.20 Surface water	MCO will not be able to prevent ongoing pollution of river water if the proposal is approved. Uncontrolled overflow of sediment dams and mine water dams is not acceptable and should not be approved.	3.4
Daryl Morris	Newtown	C20.1 Surface water	Cumulative loss of flow to the river system has not been adequately assessed.	4.1
		C20.2 Surface water	Refer to C19.17	8.12
Kay Binns		C21.1 Greenhouse gases	Refer to C5.3	7.2.3
		C21.2 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C21.3 Noise	Refer to C5.5	6.2
		C21.4 Air quality	Refer to C5.6	7.1.2

**Table B.1 Summary of community and special interest submissions and responses**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	<b>Addressed</b>	
		C21.4 General	General statement that money should be spent on renewable energy.	8.3
		C21.5 Groundwater	Refer to S2.4	4.3
		C21.6 Ecology	Refer to C5.4 and C5.7	5.4
Tony Macdougall	Mudgee	C22.1 Greenhouse gases	Australia should not be contributing to increased greenhouse gas emissions by exporting such huge quantities of coal.	7.2.2
Nell Schofield	Elizabeth Bay	C23.1 Proposed modification	Refer to S1.2 and C5.2	5.2
		C23.2 Greenhouse gases	The burning of 30 million tonnes of coal extracted will add unacceptable levels carbon dioxide into a global atmosphere already overburdened with carbon.	7.2.2
		C23.3 General	All species on earth will suffer as a result of this irresponsible behaviour.	8.4
		C23.4 General	Need to encourage a transition to alternative energy production.	8.3
Withheld		C24.1 Surface water	The scale of disturbance combined with a poorly designed mine water management plan leads to the risk of potentially significant downstream impacts on river water quality at The Drip and into Goulburn River National Park.	3.4
		C24.2 Assessment and approvals process	Represents an abuse of the planning process whereby a new mine development having gained planning approval can substantially increase its mining footprint and environmental and community impacts by increment.	8.12
		C24.3 Greenhouse gases	Five year extension to mine life is unacceptable. Coal mining activities should be reducing rather than increasing. Proposal will add in excess of 576 million tonnes of carbon dioxide to the atmosphere, contributing to climate change.	7.2.3
		C24.4 Ecology	Refer to C5.4 and C5.7	5.4
		C24.5 Surface water	The proposed water management plan is under designed and allows for mine water discharge into the Goulburn River during moderate to high rainfall events and relies on a high risk strategy that uses a series of sediment and mine water storage dams dependent on a complicated pumping regime with little room for human error or climatic extremes.	3.4
Withheld		C25.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C25.2 Ecology	Refer to C5.4 and C5.7	5.4
		C25.3 Visual	Refer to C19.11	8.5

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
		C25.4 Groundwater	Spurious legislation that enables mines to utilise groundwater without a permit has and will continue to have unacceptable impacts that deplete and contaminate subterranean and above ground watercourses.	4.4
		C25.5 Surface water	Open Cut 2 must not be allowed to extend within 100 m of Moolarben Creek (headwaters of Goulburn River).	3.2
		C25.6 Surface water	Refer to S1.6	3.4
		C25.7 Surface water	Refer to C5.8	3.2
		C25.8 Surface water	Sediment or mine water dam overflows or offsite discharges, as a result of the overburden emplacement on the edge of Moolarben Creek, will impact downstream ecology and water quality of Goulburn River.	3.2
		C25.9 Rehabilitation	Location of the haulage road down the centre of the open cut mine area until 2033 (life of mine) will severely limit progressive rehabilitation and clean water management and diversion.	8.7
		C25.10 Greenhouse gases	The 576 million tonnes of carbon dioxide that will be produced over the life of the mine is not sustainable.	7.2.2
		C25.11 Groundwater	Water licenses are exempt for use of water for mining, which is not the way water resources should be managed.	4.4
Withheld	Gulgong	C26.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C26.2 Ecology	Refer to C5.4 and C5.7	5.4
		C26.3 Noise	Refer to C5.5	6.2
		C26.4 Air quality	Refer to C5.6	7.1.2
		C26.5 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C26.6 General	Statement that government should stop investing in unsustainable practices such as coal mining and invest in renewable resources.	8.3
Withheld		C27.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C27.2 Ecology	Refer to C5.4 and C5.7	5.4
		C27.4 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C27.5 Groundwater	Refer to S2.4	4.3
Withheld		C28.1 Proposed modification	Refer to S1.2 and C5.2	8.2

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
		C28.2 Noise	Refer to C5.5	6.2
		C28.3 Air quality	Refer to C5.6	7.1.2
		C28.4 General	Environmental impacts extended for too long at 33 years.	7.2.3
		C28.5 Ecology	Refer to C5.4 and C5.7	5.4
		C28.6 Noise	Refer to C5.5	6.2
		C28.7 Air quality	Refer to C5.6	7.1.2
		C28.8 Surface water	Downstream water quality and impact on the flows to the Goulburn River.	3.2
		C28.9 Surface water	Refer to S1.6	3.4
		C28.10 Groundwater	Refer to S2.4	4.3
Withheld		C29.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C29.2 Ecology	Refer to C5.4 and C5.7	5.4
		C29.3 Noise	Refer to C5.5	6.2
		C29.4 Air quality	Refer to C5.6	7.1.2
		C29.5 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C29.6 Surface water	Refer to S1.6	3.4
		C29.7 Social	Refer to C2.2 and C2.3	8.4
Withheld		C30.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C30.2 Transport	Increased traffic and safety regarding maintenance and repair of Ulan Road. The current voluntary agreement between mines is inadequate and State Government assistance is required.	8.9
Withheld		C31.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C31.2 Ecology	Refer to C5.4 and C5.7	5.4
		C31.3 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C31.4 Groundwater	Refer to S2.4	4.3
		C31.5 Ecology	Refer to C3.2	5.4
Withheld	Denman	C32.1 Proposed modification	Refer to S1.2 and C5.2	8.2
		C32.2 Transport	Increase traffic through Yarrowa Road near Denman, which is used by mine workers travelling west as a 'short cut'.	8.9

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
		C32.3 Surface water	The proposal will increase salinity levels in the Goulburn River as saline water leaks from storage on site.	3.2
		C32.4 Greenhouse gases	Refer to C3.3	7.2.2
		C32.5 Ecology	Refer to C5.4 and C5.7	5.4
		C32.6 Noise	Refer to C5.5	6.2
		C32.7 Air quality	Refer to C5.6	7.1.2
		C32.8 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C32.9 Groundwater	Refer to S2.4	4.3
David Watson	Rozelle	C33.1 Proposed modification	Refer to S1.2	8.2
		C33.2 Assessment and approvals process	Proposal is an attempt via stealth to significantly increase the size of the mine.	8.12
		C33.3 Groundwater	Refer to S2.4	4.3
		C33.4 Surface water	Refer to S1.6	3.4
		C33.5 Ecology	Refer to C5.4 and C5.7	5.4
		C33.6 Surface water	Refer to C5.8	3.2
Ann Finegan	Kandos	C34.1 Groundwater	Additional pressure on the Goulburn River and the fragile aquifer system.	4.4
		C34.2 Ecology	Expanded threats to flora and fauna in the eco-retreat, Stone Cottages, where drilling is proposed.	5.10
		C34.3 Ecology	Clearing of woodland, including communities protected by state and federal law.	5.4
		C34.4 General	Changing character of the area with respect to Mudgee's reputation for tourism, wineries and agriculture.	8.4
Margaret Roberts	Leichardt	C35.1 Surface water	Refer to C5.8	3.2
		C35.2 Ecology	Refer to C5.4 and C5.7	5.4
		C35.3 Water	Refer to C3.4	3.2 and 4.4
		C35.4 Social	Request that Government must represent the community and state and reject the proposed modification.	8.12

**Table B.1 Summary of community and special interest submissions and responses**

<b>Respondent</b>	<b>Location when provided</b>	<b>Issue</b>	<b>Addressed</b>	
David Stokes	Cooyal	C36.1 Noise	Removal of hills between Stage 1 and 2 mining areas and the removal of the hill to the south of Stage 2 will increase noise impacts to the residents property (Receiver 32) located to the south (end of Moolarben Road) as the noise travels down the valley as well as to properties on Ridge Road.	6.1
		C36.2 Noise	Property excluded from the noise assessment - requests accurate assessment to include property with appropriate mitigation actions incorporated.	6.1
		C36.3 Noise	Increase vibration and overpressure from blasting.	6.4
		C36.4 Groundwater	Concern for continuity of the Spring Water source with feeds 90% of the agricultural enterprise and domestic requirements on resident's property.	4.4
		C36.5 Air quality	Increased dust levels to residents property and surrounding National Park including Munghorn Gap Nature Reserve as a result of the haul road which is greater than 12 km.	7.1.2
		C36.6 General	Suggests MCO uses enclosed conveyors to transport coal to the CHPP to minimise impacts to air quality, visual amenity and reduce noise via a lower number of required traffic movements.	6.2, 8.3
		C36.7 Cumulative effects	Cumulative effect of Wilpinjong Coal Mine and the MCP on resident's property.	8.4
Steve Philips	Hamilton	C37.1 Greenhouse gases	Significance of the release of more than 555 million tonnes of carbon dioxide is downplayed.	7.2.1
		C37.2 Ecology	Cumulative impacts of the proposal and other mines in the area on biodiversity.	5.7
		C37.3 Proposed modification	Refer to C5.2	8.2
		C37.4 Ecology	Refer to C5.4 and C5.7	5.4
		C37.5 Noise	Refer to C5.5	6.2
		C37.6 Air quality	Refer to C5.6	7.1.2
		C37.7 Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C37.8 Groundwater	Refer to S2.4	4.3
		C37.9 Surface water	Refer to S1.6	3.4

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
Colin Imrie	Ulan	C38.1 Proposed modification	Refer to S1.2	8.2
		C38.2 Surface water	Since 2007 the process of multiple modifications has led to a much larger mine being sought than originally came before the expert panel and planning authorities, and with significantly increased risk of polluting the Goulburn River as part of the design.	3.2
		C38.3 Assessment and approvals process	The expansion by increment is an abuse of the planning system.	8.12
		C38.4 Surface water	Formation of bigger scale continuous pits will produce more quantities of polluted water.	3.4
		C38.5 Surface water	Open pits and earthworks next to floodway's cannot be made safe even by claims they are above historical flood levels - made worse by extreme weather events as a result of climate change.	3.4
		C38.6 Economic	The project will only be viable if publicly subsidised and allowed to pollute the Goulburn River, The Drip and Corner Gorges.	8.10
		C38.7 Surface water	Pollution events will become more frequent.	3.2
		C38.8 Economic	Damage to the riverine environment not included within cost calculations, as a result of new guidelines.	8.10
		C38.9 General	The justification to maximise resource recovery is not realistic or in the public interest.	8.3 and 8.10
		C38.10 Greenhouse gases	Main contributors to increased carbon pollution are known to be clearing of broad scale clearing of intact vegetation and oxidation of fossil carbon, which should be heeded.	7.2.2
		C38.11 General	General statement that the main justification for the proposed modification is short term profits and that the resource wealth generated by mining projects in the area has not been adequately used to rehabilitate the area. At the very least the Drip and Corner Gorges should be included in a National Park and the Cook's Gap Community and Moolarben Valley should not be subjected to more impacts.	8.12
		C38.12 Economic	The analysis of economic benefit for the proposed modification is based on the assumption of the long term economic value of thermal coal, which is an illusion in a volatile world economy and with changing social and environmental factors.	8.10

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
		C38.13 Economic	Predictions for continued employment at current levels is naive given the future world market for coal based on scientific and economic evidence.	8.10
		C38.14 Noise and air quality	Increased stress to residents of Ridge Road and Cook's gap area due to dust and noise impacts which are hard to quantify. Suggested use of overburden and tree planting is inadequate.	6.1 and 7.1.1
		C38.15 Visual	Visual pollution to residents of Ridge Road and Cook's gap area. Suggested use of overburden and tree planting is inadequate.	8.5
		C38.16 Noise and air quality	Extensive haul road becoming more than 13 km long will guarantee escalating problems with dust and noise levels.	6.2, 7.1.2
		C38.17 Assessment and Approvals process	No expansion should be allowed until The Drip and Corner Gorges are included into the National Park and excluded from mining.	8.12
		C38.18 Ecology	Statement that adequate offsets are good in theory, but in practice need careful consideration and are not for mining companies to keep in reserve to mine later.	5.9
		C38.19 General	Damage to eco tourism business as a result of damage to riverine environment.	8.4
Julia Imrie	Ulan	C39.1 Proposed modification	Refer to S1.2	8.2
		C39.2 Assessment and Approvals process	Approving the proposed modification with all other modifications and the Stage 2 proposal will cause the community to lose confidence in the planning process.	8.12
		C39.3 Surface water	MCO has a poor record in the design and implementation of the Stage 1 Water Management Plan that has resulted in a number of breaches for uncontrolled offsite sediment discharges into the Goulburn River system and the suspension of EPL water quality limits on mine discharges in 2010 following a period of high rainfall.	3.4
		C39.4 Surface water	Refer to C5.8, 5.9 and 5.10	3.2, 3.3 and 3.4
		C39.5 Visual	Refer to C38.14	8.5
		C39.6 Surface water	The restoration of a stable catchment depends on successful and progressive rehabilitation and revegetation of the disturbed footprint, however many of the open cut pits remain open for the life of the mine to allow for coal haulage and water storage for mine operations.	8.7
		C39.7 Noise and air quality	Ridge Road and Cook's Gap community will experience increased noise and dust pollution.	6.2 and 7.1.2



**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue	Addressed	
	C39.10	General	The reliance on extensive coal truck haulage roads should not be permitted rather an elevated conveyor belt system should be the preferred mode of coal transport of the operations area. This would allow for a more efficient clean water surface diversion management structures and remove unacceptable delays in rehabilitation of the central pit area.	8.3
	C39.11	Economic	The economic justification is questionable. The latest climate commission report warns that 80% of global fossil fuel reserves will have to stay in the ground to avoid exceeding a 2-degree rise in global temperatures and dangerous climate change. This has implications for the economic predictions.	8.10
	C39.12	Surface water	The WMP is under designed for the scale of the open cut operations, total surface disturbance and rainfall regime.	3.4
	C39.13	Surface water	The WMP is a high risk water management strategy dependent on a series of sediment and mine storage dams maintained by a complicated pumping regime with little room for human error or climatic extremes.	3.4
	C39.14	Surface water	The WMP depends on the suspension of pollution control limits should rainfall exceed 44 mm over five consecutive days. This would permit uncontrolled overflows from MCO sediment dams and mine water dams. The suspension of water pollution is an admission by MCO it is unable to manage the volume of onsite water runoff for a moderate high rain event.	3.4
	C39.15	Surface water	The WMP uses prescriptive parameters that do not reflect natural water quality fluctuations in the river system and receiving waters.	3.4
	C39.16	Surface water	The purchase of water licenses to offset groundwater loss from Moolarben Creek cannot compensate baseflows when a 'cease to pump' restriction would have applied to the license ie critically low stream flows during extended dry periods.	3.3
	C39.17	Surface water	Unacceptable cumulative reduction in catchment runoff and groundwater recharge that support stream and baseflows.	3.3
	C39.18	Surface water	Significant water demand of between 1500-2380 ML/year required for dust suppression and coal preparation.	3.4
	C39.19	Surface water	The need for a substantial increase in the EPL volume of water discharged offsite from 800KL/year to 10 ML/year is symbolic of the inadequate predictions that have plagued the Stage 1 water management.	3.4

**Table B.1** Summary of community and special interest submissions and responses

Respondent	Location when provided	Issue	Addressed	
	C39.20	Groundwater	Substantial risk that the extension and location of Open Cut 2 (depth 20 m) within 100 m of Moolarben Creek and 170 m from 'known' alluviums may breach the NSW Aquifer Interference Policy which require there to be no more than a 2 m drawdown in groundwater levels (whether extracted directly for consumptive purposes or taken incidentally) or the long term average salinity does not increase by more than 1% per activity.	4.4
	C39.21	Groundwater	No reference to the potential impact on remnant Forest Red Gums GDE associated with the alluvial flats of the Moolarben Valley.	5.10
	C39.22	Surface water	The protection of the downstream river health and water quality of the Goulburn River at The Drip and National Park requires outcome based conditions and regulations supported by real-time monitoring and effective penalties.	3.2
	C39.23	Groundwater	Statement that the Goulburn River at The Drip Picnic Area and downstream is a natural 'high value' stream under direct pressure from upstream mining activities. Contamination of the sandy stream bed by fine delay sediments, a doubling of background salinity levels, increasing algae blooms and declining aquatic biodiversity are clear warning signs that the system is under pressure.	3.4
	C39.24	Surface water	Not acceptable to merely monitor and document the decline in the health of the river systems.	3.4
	C39.25	Surface water	The MCO review of baseline water quality monitoring data for receiving water concludes upstream and downstream water quality parameters were 'fairly consistent', and turbidity 'generally exceeds ANZECC trigger values' at most sites (P. 16/17 App I.WRM). These conclusions were based on the simplistic analysis of maximum, minimum and average data and as such misrepresent upstream and downstream river water quality. A representative range of percentiles is a more meaningful and comparable guide to determine baseline conditions in this dynamic stream system that can be subject to external point source discharges that skew the data range. The downstream turbidity of river flow is normally <10 NTU (+90 percentile) well within the ANZECC guidelines for upland rivers. The maximum EC of 1680 µS/cm and 1560 µS/cm apparently recorded at The Drip (SW01) and Drip Picnic Area (SW02) respectively are examples of a spurious reading due to a point source mine water discharge and should be identified as such.	3.4

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue		Addressed
		C39.26 Surface water	MCO monitoring methodology of sediment dam runoff and stream sites when there a rain event exceeds 30mm over 24 hours is essentially flawed. A pulse of storm water after such a rain event would travel more than 17 kms downstream in 24 hours (using a conservative speed of 0.2m/s - average centre channel flow rate of the Goulburn River is 0.35 m/s). Sampling needs to occur within 12 hours of the rain event - preferably using continuous hourly loggers. This would allow all rainfall events that produce runoff and stream flow to be monitored including intense summer storms where even 15 mm rain can produce significant runoff (particularly if it falls within 2 hours or on saturated soils).	3.4
		C39.27 Surface water	A number of recommendations are made to MCO's water management system: The scale of surface disturbance is reduced and clean water diversion drains installed where-ever feasible to ensure realistic and effective surface water management; Installation of continuous loggers (hourly) for monitoring of water quality at discharge sites, dam overflow points and upstream and downstream receiving waters to ensure water quality parameters are recorded within 10 hours of a rain event:>25mm over 24 hours/>15mm over 2 hour period; Environmental regulations and conditions for protecting downstream water quality and in stream ecology are outcome based requiring all offsite discharges to reflect the 'real-time' quality of receiving waters (eg turbidity, salinity and pH); Rehabilitated land is returned to clean water catchment only when over 70% perennial ground cover has been achieved (minimum 3 years); and, Effective and prompt deterrent penalties are included in the regulations.	3.4
		C39.28 Ecology	The clearing of an additional 172 hectares of native forest is a significant loss adding to the cumulative loss of 868 ha plus potentially Stage 2 Open Cut 4.	5.4
		C39.29 Ecology	To provide tangible compensation for the net loss in habitat and EEC communities from the proposed clearing there must also be an equal net gain in habitat condition.	5.9
Don and Ann Coventry	Cook's Gap	C40.1 Noise	Refer to C5.5	6.2
		C40.2 Air quality	Refer to C5.6	7.1.2
		C40.3 Transport	Increased traffic and the deterioration of roads.	8.9
		C40.4 Ecology	Refer to C5.4 and C5.7	5.4
		C40.5 General	Destruction of agricultural land.	8.11

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue		Addressed	
		C40.6	Cumulative effects	General statement regarding the cumulative impact on mining in the area, including the constant noise and traffic, the destruction of wildlife habitats and dangerous road conditions.	5.4, 8.4 and 8.9
Michael and Lynette Campbell	Jilliby	C41.1	Proposed modification	Refer to S1.2 and C5.2	8.2
		C41.2	Ecology	Refer to C5.4 and C5.7	5.4
		C41.3	Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C41.4	Groundwater	Refer to S2.4	4.3
		C41.5	Surface water	The mine has demonstrated an inability to manage pollution incidents and has been fined a number of times for breaching conditions of approval.	3.4
		C41.6	Assessment and approvals process	Noting recent findings in the Land and Environment Court regarding destruction of social fabric, ESD principles and also the Precautionary Principle in relation to the Warkworth expansion and the township of Bulga the proposed modification should be rejected.	8.1 and 8.12
Murray Scott	Heathcote	C42.1	Assessment and Approvals process	The proposed additional modification of the Stage 1 operation under this Environment Assessment is integral to the pending Stage 2 Project proposal and their impacts should be assessed as a whole.	8.12
		C42.2	Assessment and Approvals process	In many instances, the Stage 1 Modification EA document relies on comparison with that of the existing Stage 1 project, using a 'foot in the door' approach to justify development which, together with Stage 2, will result in quadrupling the affected area as a minor variation on the previously approved operation.	8.12
		C42.3	Cumulative effects	General statement that by incremental encroachment longwall subsidence and the devastation of open cuts has blighted farms, vineyards, streams, forest remnants, Aboriginal and European historical sites, villages and town communities throughout the Goulburn and Hunter Valleys.	8.4 and 8.6
		C42.3	General	General statement that the combined Stage 1 and 2 proposals exemplify an industry out of control, with no planned endpoint short of destruction of the entire Hunter/Goulburn Valley community and ecosystem.	No response required
		C42.4	General	The project impacts streams, woodlands, farms and communities.	Chapters 3 and 5

**Table B.1 Summary of community and special interest submissions and responses**

Respondent	Location when provided	Issue		Addressed	
		C42.5	General	General statement that by buying and lease-back of farms under development restrictions, Moolarben Coal has terminated historical family tenures dating from the early 19th century, leaving improvements, homes, historic buildings and sites to decay into oblivion.	8.4
		C42.6	General	General statement regarding the respondent's connection to the land and its relics.	No response required
		C42.7	General	Statement regarding Stage 2 and the impacts to ecology and surface water.	No response required
		C42.8	General	General statement regarding government hypocrisy in planning for growth in the coal industry.	No response required
		C42.9	Greenhouse gases	Provision of details of Stage 2 greenhouse gas emissions and discussion generally.	No response required
Veronica Burns	Mudgee	C43.1	General	General statement that the mines existing impacts on the environment and people who live in the district and further afield are huge.	No response required
		C43.2	Ecology	Refer to C5.4 and C5.7	5.7
		C43.3	General	General statement that mining companies are immune to opposition by people to coal mining and they are dismissive of government requirements.	8.12
		C43.4	Surface water	Refer to S1.6	3.4
Wendy Arnott	Mudgee	C44.1	Surface water	Refer to C5.8, C5.9 and C5.10	3.2, 3.3 and 3.4
		C44.2	Groundwater	Refer to S2.4	4.3



## Appendix C

### Government agency submissions

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**Table C.1 Summary of government agency submissions and responses**

Respondent		Issue		Addressed	
G1	MWRC	G1.1	Economic	Erosion of Council rate base due to project approvals requiring biodiversity offsets. Current proposal further expands offset requirements and will result in either further land being dedicated as National Park or the establishment of conservation agreements. Consider that where there is an adverse impact on the regions rate base due to the change in land tenure compensation should be provided.	8.10
		G1.2	Traffic	Contributions to the road network has been an ongoing issue for MWRC. Nevertheless, the Ulan Road Strategy has been negotiated over a 20 year maintenance period. This would accommodate the Stage 1 approval period as extended to 2033. The Stage 1 approval does not require MCO to enter into the upgrade agreement. Although this will be conditioned under Stage 2, if approved, MWRC considers that this should be conditioned for Stage 1 as part of the approval for the proposed modification.	8.9
		G1.3	Noise	Concerns regarding potential noise impacts in the Ridge Road, Winchester Crescent and Cook's Gap area are ongoing. Considered essential that adequate and fair acquisition measures are included within conditions of approvals should the noise affectation exceed the predictive modelling outlined in the EA.	6.5
G2	RMS	-	-	As the proposed modification does not seek to increase the number of road and rail movements beyond current approvals, RMS will not make a submission.	Noted in 8.9
G3	Crown Lands	G3.1	General	The extension to Open Cut 1 encroaches on Crown reserve land (Reserve No.80525, being Lot 7010 DP 1025345), and other parts of the proposal encroach on Crown road.	8.9
G4	NSW Office of Water	G4.1	Water	Notes that there will be negligible increase of inflows as a result of the proposed modification, and that all inflows will be accounted for under an existing licence under Part 5 of the <i>Water Act 1912</i> . Understands that there may be a small impact on baseflows to Moolarben Creek; however, MCO is in the process of acquiring a water access licence that will fully account for the impacts from the proposed modification.	Noted in 4.2
		G4.2	Groundwater	Notes that the proposal falls within Level 1 of the minimal impact considerations of the AIP, which is defined as acceptable.	Noted in 4.4
		G4.3	Water	Notes that an increased volume of surface water will be intercepted as a result of the proposed modification; however, it is not clear how this water will be accounted for. The proponent needs to estimate the volumes of water taken from both the surface water, including rainfall runoff, and groundwater from each water source to determine licensing requirements.	3.1 and 4.2

**Table C.1 Summary of government agency submissions and responses**

Respondent	Issue	Addressed	
G4.4	Water	Recommends MCO develops strategies on how to manage the surface and groundwater in a modified land form, and should also update the Water Management Plan to accommodate the proposed modification.	3.1 and 4.4
G4.5	Groundwater	Notes that potential groundwater impacts of the project are: leakage of groundwater from shallow aquifers; changes to base-flows in surface drainage systems; impacts on water supply bores and wells; potential changes in groundwater quality in water bearing strata; long term void discharge and water quality; and, impacts on groundwater dependent ecosystems.	No response required
G4.6	Water	Notes that MCO is currently in the process of purchasing a licence of 9 ML/year to offset impacts on the Goulburn River water source (Moolarben Creek). It is considered this licence will cover any minor loss to the Goulburn River water source through reduced baseflow to Moolarben Creek from the proposed modification.	Noted in 4.2
G4.7	Groundwater	Notes that the proposed modification will have a nil impact on The Drip, the only significant seep/spring GDE within the locality. Stage 2 modelling predicted nil impact on The Drip due to its relative distance from and limited hydraulic connection. The proposed modification will have nil change in the groundwater drawdown in the vicinity of The Drip. Therefore, there will be no impact on vegetation supported by The Drip.	Noted in 4.3
G4.8	Water	Notes the EA states that the water level and pit seepage data collected to date is within the ranges predicted by previous investigators using numerical models, which verifies the soundness of the previous studies. As the previous models had been gradually refined over time as new data was collected, had been subject to peer review, and were showing good agreement with field data, they were deemed appropriate for use in assessing the impact of the proposed modification, and no further modelling was undertaken. Mine inflows for the majority of the proposed modification are stated to be within the range predicted for Stage 1 and Stage 2. A large proportion of the proposed extension area is within landscapes that are 'dry' or contain limited saturated thickness of groundwater above the base of the Ulan Seam.	Noted in 4.1
G4.9	Groundwater	Groundwater levels and water quality are currently monitored in approximately 60 bores. The current monitoring regime of groundwater levels and water quality is considered sufficient to monitor the effects of the proposed modification.	No response required
G4.10	Water	No exemptions for licences under the <i>Water Act 1912</i> as a result of approval under the EP&A Act. Water Access Licences are required to take water from any water source managed under the <i>Water Management Act 2000</i> .	4.2

**Table C.1 Summary of government agency submissions and responses**

Respondent		Issue		Addressed	
G5	NSW Agriculture	G5.1	General	Advises that the original Director General requirements have been addressed in relation to agricultural land issues; there are no concerns with the proposed modification on the understanding that most of the land to be impacted by this modification is land unsuitable for agriculture, with the final landform to consist of mainly lands that will be vegetated for biodiversity and stability outcomes; and the soil and land assessment has confirmed that no land could be considered as Biophysical Strategic Agricultural Land and there is no evidence of any critical industry cluster. No agricultural socio- economic assessment needed to be undertaken as part of the project requirements.	Noted in 8.11
G6	NSW Fisheries	G6.1	General	Advocates the use of terrestrial riparian buffer zones as per the policy and guidelines for <i>Fish Habitat Conservation and Management Update 2013</i> , and requests that adequate riparian buffer zones be established, particularly with regards the proposed extension of Open Cut 2 and proximity to Moolarben Creek.	5.9
G7	NSW Office of Environment and Heritage	G7.1	Ecology	Recommends that, given the strong likelihood that pure <i>E. cannonii</i> occur on the site, the species should be assessed accordingly, unless MCO has confirmed its absence.	5.2
		G7.2	Ecology	Recommends provision of a comparison information in table format to compare flora and fauna survey effort at the proposed project area with the survey effort requirements as prescribed in DEC (2004) and provide justification for reduced survey effort in the cases where it does not meet the prescribed effort.	5.2
		G7.3	Ecology	Recommends flora surveys in the appropriate flowering periods this year for those species unlikely to have been detected by the previous surveys be undertaken, or else assume the presence of these species.	5.2
		G7.4	Ecology	Recommends a clear summary of expected impacts to threatened species and their habitats, based on adequate assessment of habitat in the extension areas. Recommends this should be reflected in the required biodiversity credits.	5.6
		G7.5	Ecology	Seeks clarification whether there are other GDEs which may be impacted via the cumulative impact of mining operations in the area.	5.10
		G7.6	Ecology	Recommends that the cumulative impact (including both direct and indirect impacts) on the vegetation communities, threatened species habitat and connectivity be presented.	5.7
		G7.7	Ecology	Recommends that the EA be revised to include further assessment of the extent of cave-roosting microbat habitat on the site and the predicted level of impact on these species.	5.2

**Table C.1 Summary of government agency submissions and responses**

Respondent		Issue	Addressed
G7.8	Ecology	Recommends that the revised cumulative impact assessment and any additional assessment of cave roosting microbat habitat is taken into account in the threatened species assessments, including conclusions regarding the likely significance of impacts on these species.	5.7
G7.9	Ecology	Recommends that the revised cumulative impact assessment specifically presents conclusions regarding water quality and flow regime impacts on biodiversity as a result of the combined mining projects in the locality.	5.7
G7.10	Ecology	Recommends that 'Option 3 – the proposed extension areas' be removed from the proposed list of avoidance measures.	5.3
G7.11	Ecology	Recommends that the degree to which impacts have avoided be demonstrated, by: including maps of the additional two options that were considered in the development of the proposed modification; include maps of the original and refined extension area footprints, which indicate those areas avoided; quantify (hectares, communities and habitat) the area of impact avoided through both the chosen option compared with the other two options considered and any further modifications made to the proposed extension area footprints; and, present a more detailed assessment of the mine site identifying cave bat breeding and roosting sites and related habitat. This assessment should also identify the extent to which cliff line habitat with features suited to bat roost sites has been avoided and will be protected on the site in-perpetuity.	5.3
G7.12	Ecology	Recommends that the level of avoidance adopted in the context of the level of significance of the impacts associated with the proposal and the cumulative impact of all mining operations in the area should be justified.	5.3
G7.13	Ecology	Recommends that sufficient detail regarding all proposed mitigation measures, including type, location, and justification for their selection (eg purpose and likely efficacy) be provided.	5.8
G7.14	Ecology	Recommends that the proposed surveys for <i>Diuris tricolor</i> be undertaken in the appropriate flowering period this year and prior to any approval being granted, or assume the presence of this species and adjust assessments and mitigation measures accordingly.	5.2

**Table C.1 Summary of government agency submissions and responses**

Respondent		Issue	Addressed
G7.15	Ecology	Recommends that more detailed descriptions of each offset property, including clear identification of the condition of the DNG present as well as the condition and area of the DNG included within the offset calculations be provided. Mapping and area calculations should be supplied for the low condition vegetation/grasslands; non-EEC listed native grasslands; derived native grasslands that correspond to an EEC (EPBC Act or TSC Act); and native vegetation in moderate-good condition. The data and assumptions used to determine these classifications should also be supplied.	5.2
G7.16	Ecology	Recommends that a detailed justification should be provided for the the inclusion of restoration of DNG in the proposed offsets, including: demonstration that they have exhausted all other options and the success of the proposed restoration considering the site conditions is supported by relevant published/peer reviewed research; and, details on the land use history of any areas of DNG proposed as offsets, including cultivation history, fertilizer application and groundcover species present (native and exotic), along with information relating to elevated soil nutrients (such as with nitrate, ammonium, available phosphorus and total carbon) in order to inform the suitability of the sites for inclusion in the offset and understand the capacity of the system to respond to management.	5.9
G7.17	Ecology	Recommends that the proportion of the offset that involves protection be increased, with management and enhancement of existing remnant vegetation relative to rehabilitation/restoration works, unless adequate justification for this can be supplied.	5.9
G7.18	Ecology	Recommends comprehensive justification supporting why mine rehabilitation should be used to reduce the quantum of the offset required by: demonstrating that they have exhausted all other options; that the rehabilitation is not already required by another approval body (such as usual mine rehabilitation requirements). Recommends that any environmental benefit claimed should be above that already required by other obligations; and, the success of the rehabilitation proposed should be supported by relevant published/peer reviewed research.	5.9
G7.19	Ecology	Recommends that the supply of all credit assessments be undertaken to inform the quantum of the offset. This should include: copy of the vegetation mapping (ArcGIS shapefiles); location of vegetation plots (ArcGIS shapefiles); and, lot data including species lists and abundance rankings.	5.9
G7.20	Ecology	Recommends further examination the need for species credits for cave roosting bats.	5.9
G7.21	Ecology	Recommends that a summary of the quantum of ecosystem credits supplied by the offset strategy against the associated ecosystem credit fauna assemblages be provided.	5.9

**Table C.1 Summary of government agency submissions and responses**

Respondent		Issue	Addressed
	G7.22 Ecology	Recommends that detailed information be presented to support any claims that the required credits are not able to be secured for all entities to meet Tier 2 of the OEH Interim Offset Policy. Satisfactory justification for proceeding to Tier 3 on the credit availability grounds would also need to be provided.	5.9
	G7.23 Ecology	Recommends that a strong case to be provided for any requested reduction in the required credits on economic grounds. At a minimum, this should include: review of costings for offset purchase and management by a suitably qualified and experienced person; documentation of current land valuation in offsetting area from the Department of Finance and Services, Land and Property Information; a cost benefit analysis for the project which includes the estimated offsetting costs associated with the provision of the full quantum of required credits and taking into account any offset lands which were not purchased exclusively for the purpose of providing an offset (ie land which required acquisition for other reasons, such as noise etc, regardless of the offset requirements); and, consideration of the predicted level of impact on high conservation value vegetation communities threatened species and their habitats.	5.9
	G7.24 Ecology	Recommends further justification for any vegetation communities and threatened species habitat which proceeding to Tier 3 i(based on a) and b) above); development of the final offset strategy should include systematic application of the Tier 3 criteria in consultation with OEH.	5.9
	G7.25 Ecology	Recommends an assessment of all external factors (eg existing access arrangements for other parties, potential future infrastructure proposals and connectivity with other lands managed for conservation) which may impinge on the value of proposed offsets, the ability of the subject properties to provide the proposed offsets, and/or present management difficulties be undertaken.	5.9
	G7.26 Ecology	Recommends that an offset strategy be provided, which is appropriately located, designed, and can be secured via a method which meets the OEH Offset Principles and the requirements of the OEH Interim Offset Policy be demonstrated.	5.9
	G7.27 Heritage	Recommends that it be demonstrated how all the RAPs have been consulted for the proposed modification.	8.6
	G7.28 Heritage	Recommends that it be demonstrated how the comments raised by Murong Gialinga Aboriginal and Torres Strait Corporation have been addressed.	8.6
G8	EPA G8.1 Noise	In light of the recent Bulga-Warkworth appeal and as the proposed modification indicates that the project specific noise levels (PSNL) will be exceeded at six residences, recommends MCO undertake the evaluation required by Section 8.2.1 of the INP.	6.1

**Table C.1 Summary of government agency submissions and responses**

Respondent		Issue	Addressed
G8.2	Noise	Seeks clarification as to how the cumulative noise levels were determined and whether (if approved) the cumulative noise levels predicted for Stage 2 will alter if Stage 1 is operated as per the proposed modification, which proposes all mining activities to be undertaken 24 hours, seven days a week.	6.3
G8.3	Noise	Understands that an undertaking was made by MCO, in relation to Stage 2, to restrict coal extraction and haulage operations in Open Cut 2 and Open Cut 3 to the day time period, with overburden stripping activities to be conducted during evening and night periods to reduce noise impacts on residences located in the direction of the prevailing meteorological conditions (ENE winds). Notes that such an undertaking has not been made for the proposed modification and is considered that when prevailing meteorological conditions odour, noise levels above those predicted may occur from operations in the proposed Open Cut 1 extension area in the years 6-11 when the environmental bund is not in place. Recommends that a further justification as to why a similar restriction has not been recommended for the proposed modification.	6.3
G8.4	Air quality	Notes that PM <sub>10</sub> maximum 24-hour average concentrations will exceed 40ug/m <sup>3</sup> at some residences in the Ulan settlement. Based on previous experience the PM <sub>10</sub> maximum 24-hour average concentrations above 30 ug/m <sup>3</sup> generally trigger dust complaints in the Ulan area. So whilst there are no predicted exceedences, the predicted dust levels are likely to trigger concern by the Ulan area community.	No response required
G8.5	Air quality	Concurs with the establishment of an additional TEOM to the south-west of the MCP; however, considers it beneficial to establish this monitor in the near future, rather than in the mid to late lifetime of the mine, to establish background data in the area.	7.1.3
G8.6	Air quality	Notes that it has recently required MCO (through a Pollution Reduction Program) to assess whether it is controlling 80% of dust emissions from haul roads. Whilst MCO may be achieving such a control efficiency for haul roads, it is premature to suggest that it will continue to implement this level of control.	Noted in 7.1.2
G8.7	Surface water	Notes that the surface water impact assessment provides that sediment dam volumes have been based on a setting zone volume based on the 90 <sup>th</sup> percentile 5-day duration rainfall (35.6mm) where the setting zone equals 50% of the sediment volume. Considers that the sediment dam volumes should be sized with a conservative approach, that is, the sediment dams will only overflow during extreme rainfall events, at most 1 to 2 spills per year. As such, the EPA considers that the sediment dam volumes should be based on a 95 <sup>th</sup> percentile 5-day rainfall duration.	3.1

**Table C.1** Summary of government agency submissions and responses

Respondent	Issue		Addressed
G8.8	Surface water	Upgrades to Stage 1 water management systems have been discussed with MCO, required to complete a number of Pollution Reduction Programs to reduce the potential for sediment laden discharges. Should DP&I require the upgrades to be assessed under the EP&A Act, recommends this should form part of the proposed modification.	3.1

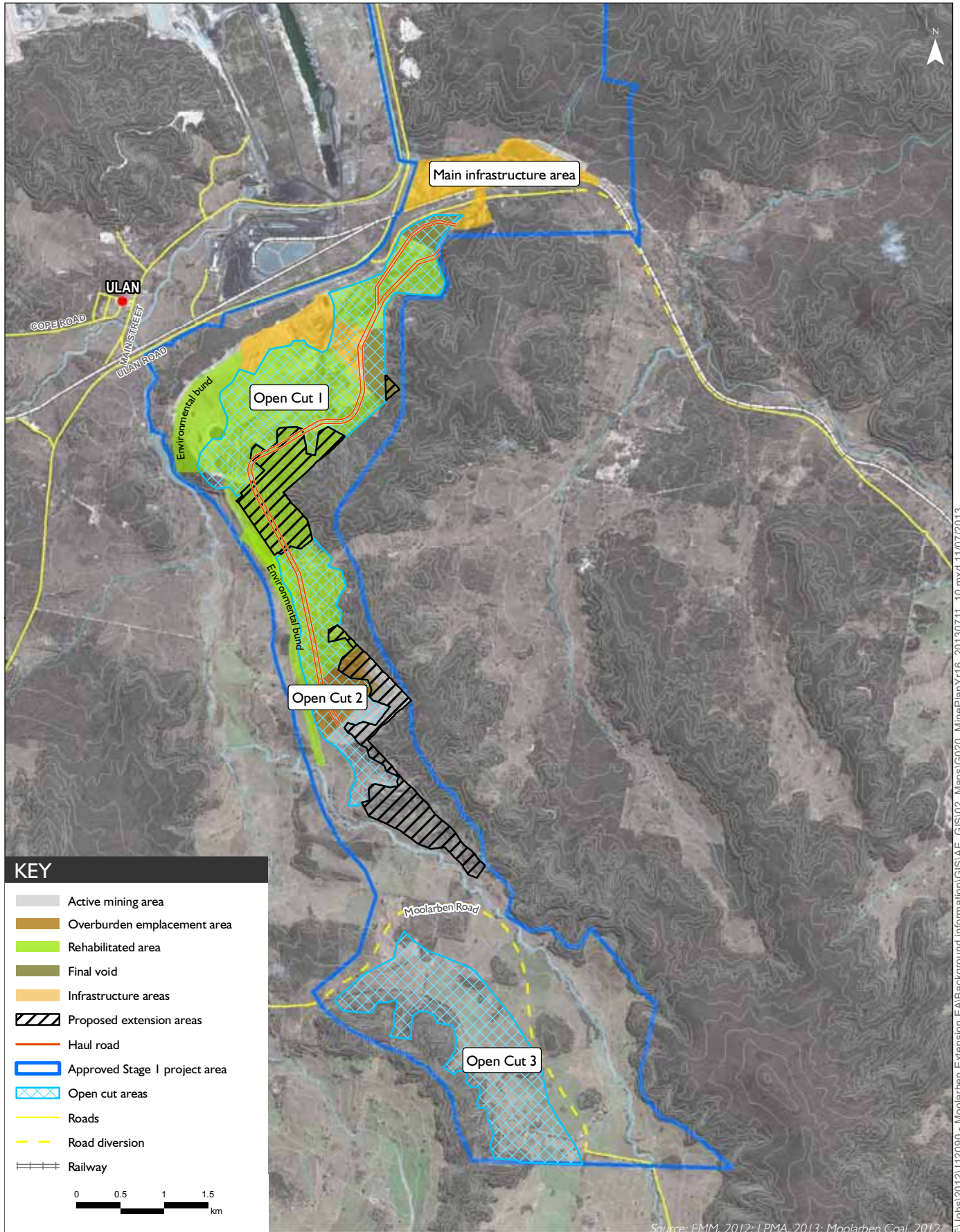


## Appendix D

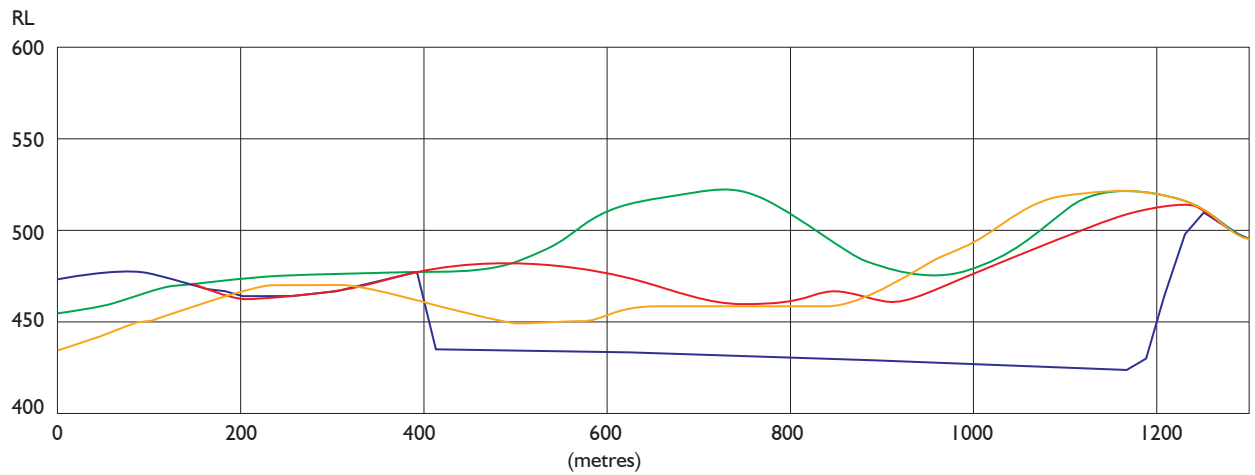
### Figures

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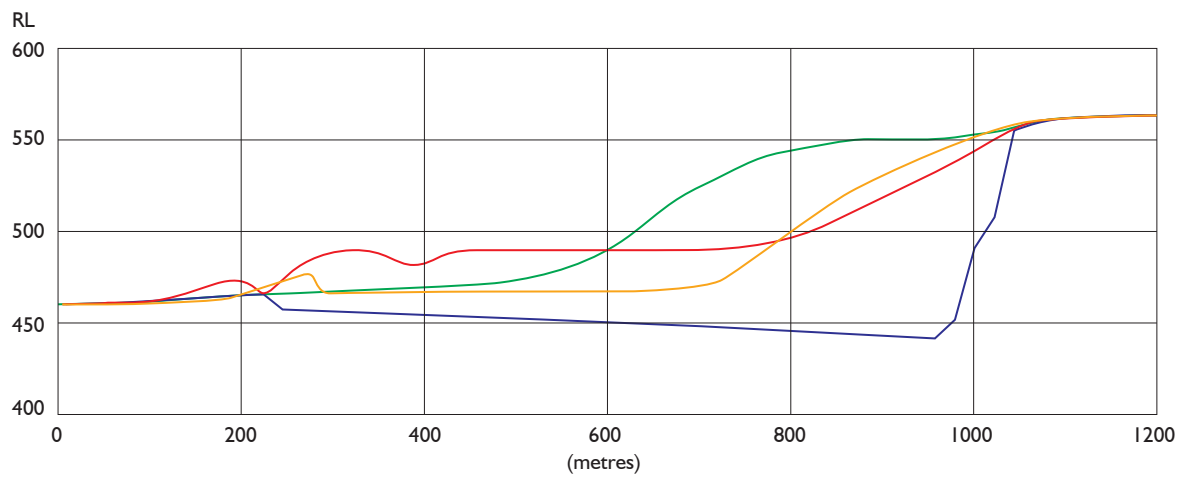




Indicative Stage I open cut mine plan - Year 16  
 Moolarben Coal Project - Stage I Optimisation Modification  
 Figure 4.4



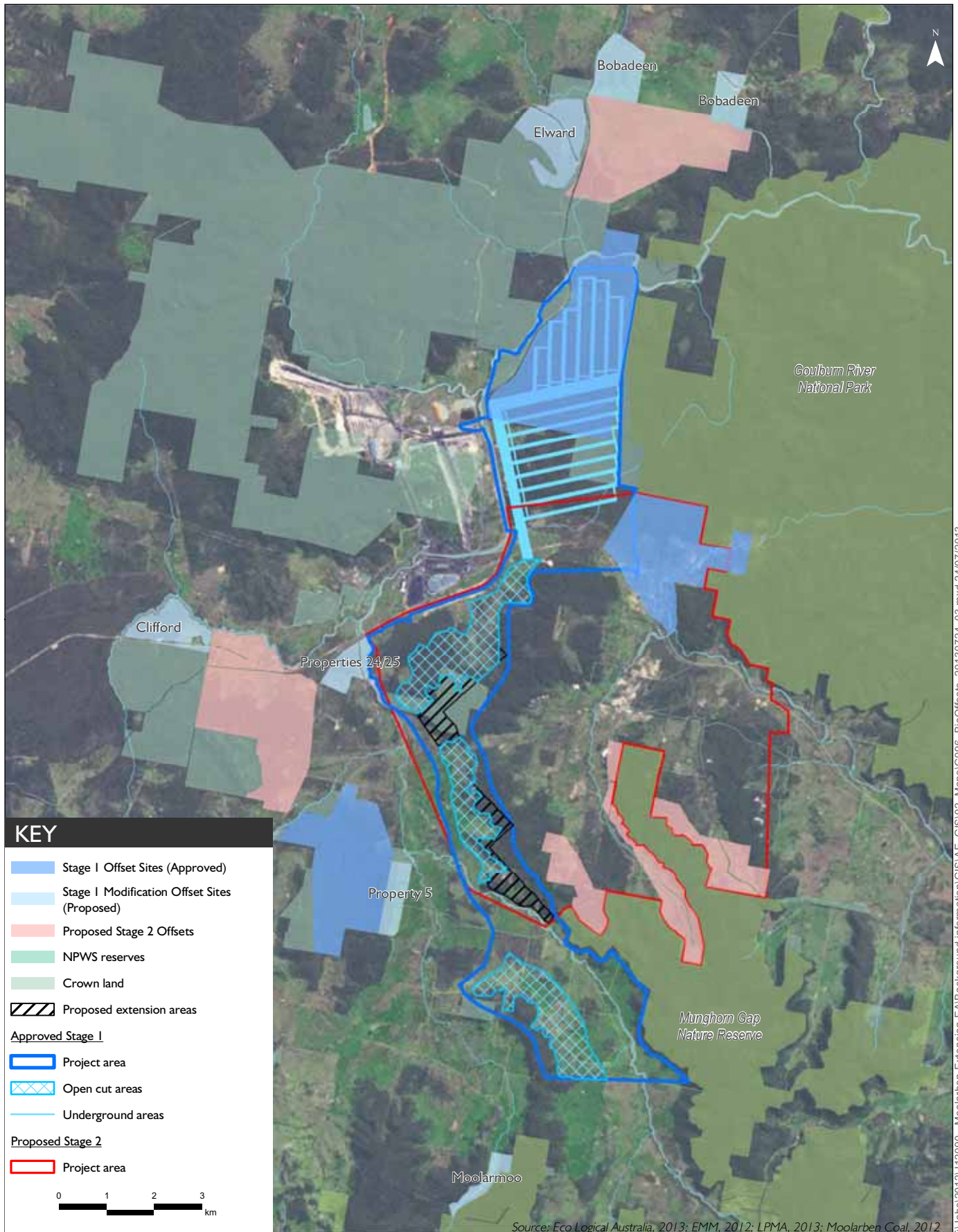
**Section A - Indicative Open Cut 1 Cross Section**  
Vertical Exaggeration 2:1



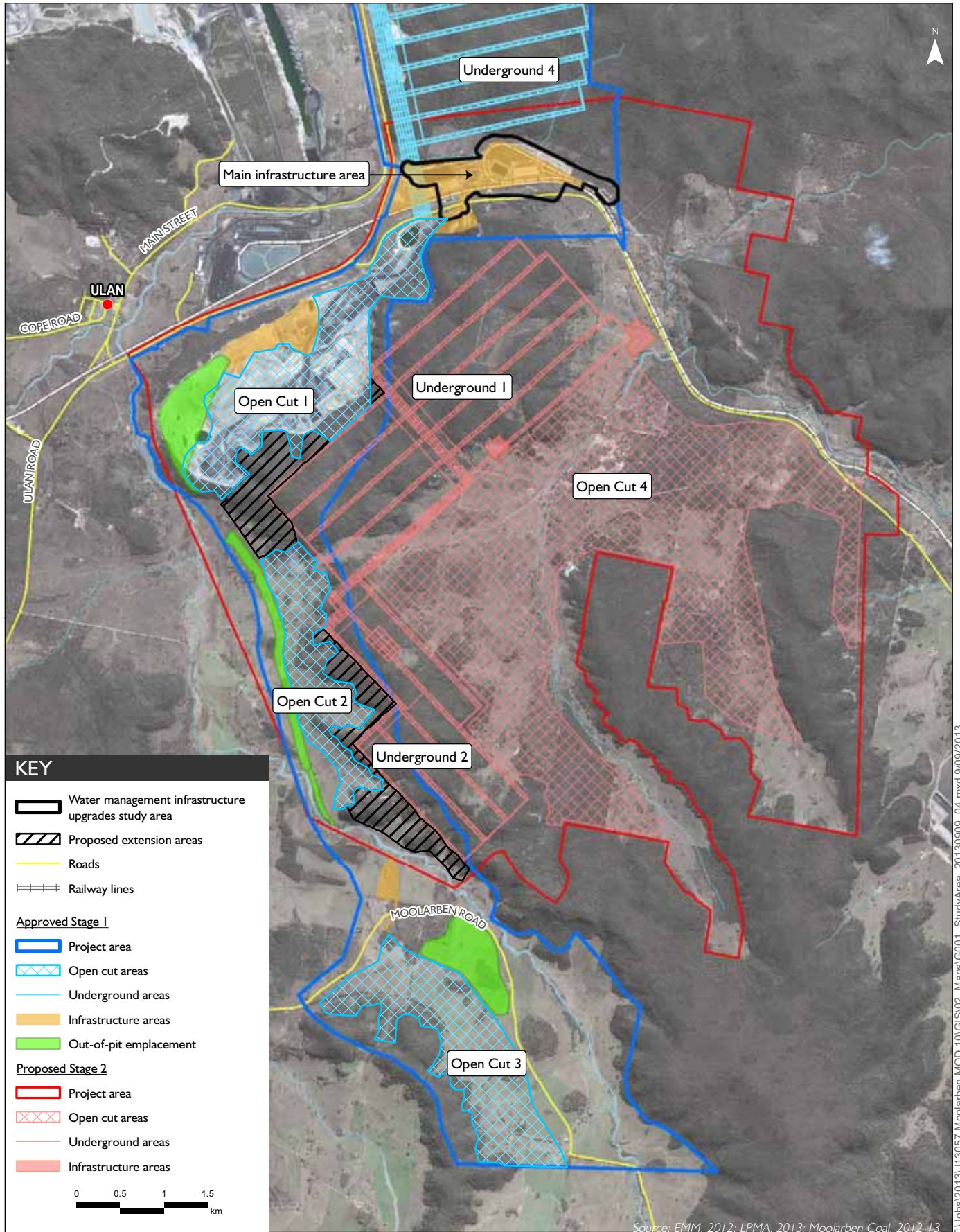
**Section B - Indicative Open Cut 2 Cross Section**  
Vertical Exaggeration 2:1

- KEY**
- Original topography
  - Final landform (proposed)
  - Final landform (approved)
  - Pit void

Source: Moolarben Coal, 2012



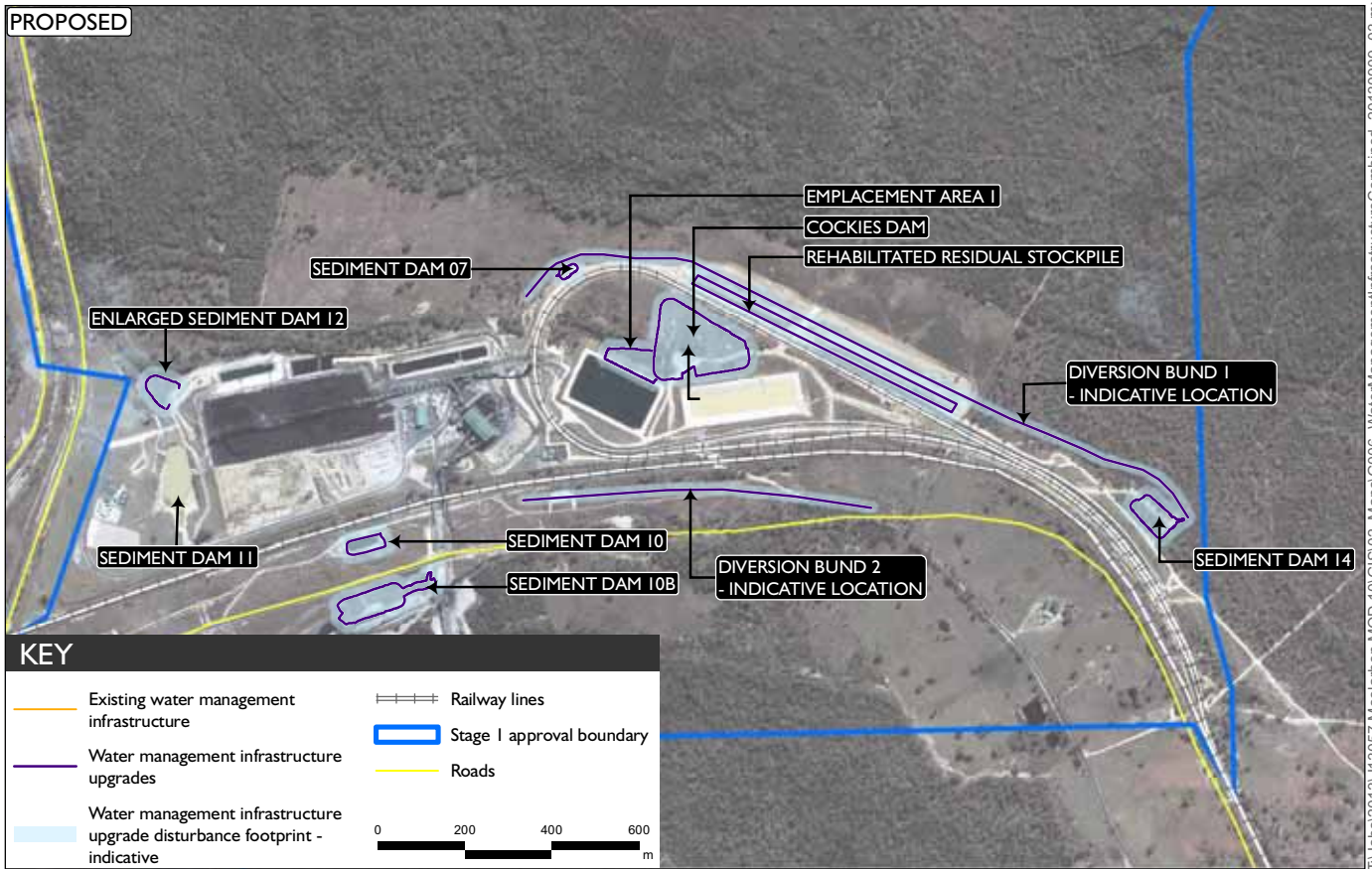
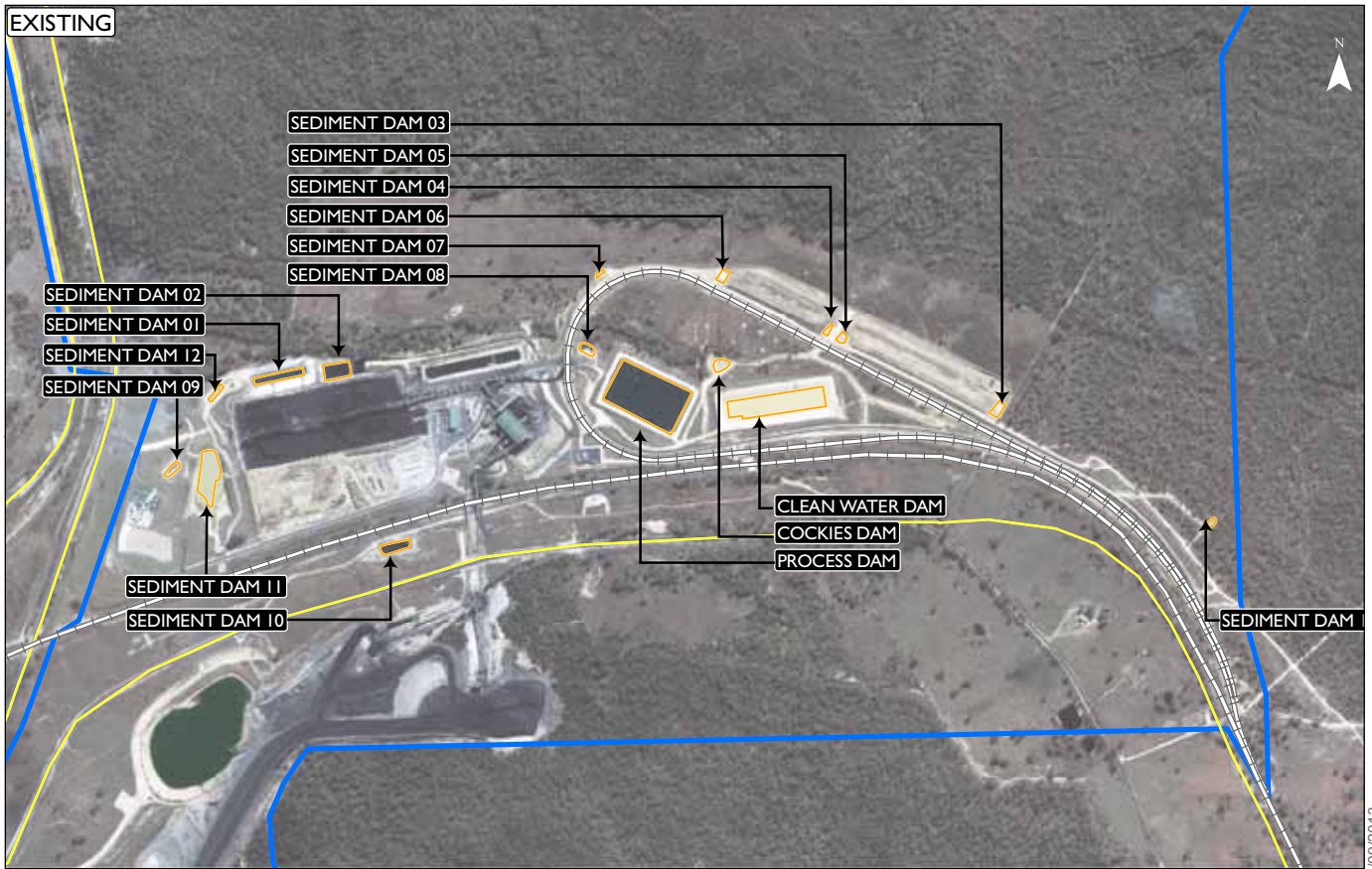
T:\Jobs\2012\12090 - Moolarben Extension EIA\Background information\GIS\AE\_GIS\02\_Maps\G096\_BioOffsets\_20130724\_03.mxd 24/07/2013



Proposed Stage I surface water management infrastructure upgrades – study area

Moolarben Coal Project - Stage I Optimisation Modification

Figure 1



T:\Jobs\2013\13057 Moolarben MOD 10\GIS\02\_Maps\G006\_WaterManagement\InfrastructureCombined\_20130909\_03.mxd 9/09/2013

Existing and proposed Stage I surface water management infrastructure

Moolarben Coal Project - Stage I Optimisation Modification

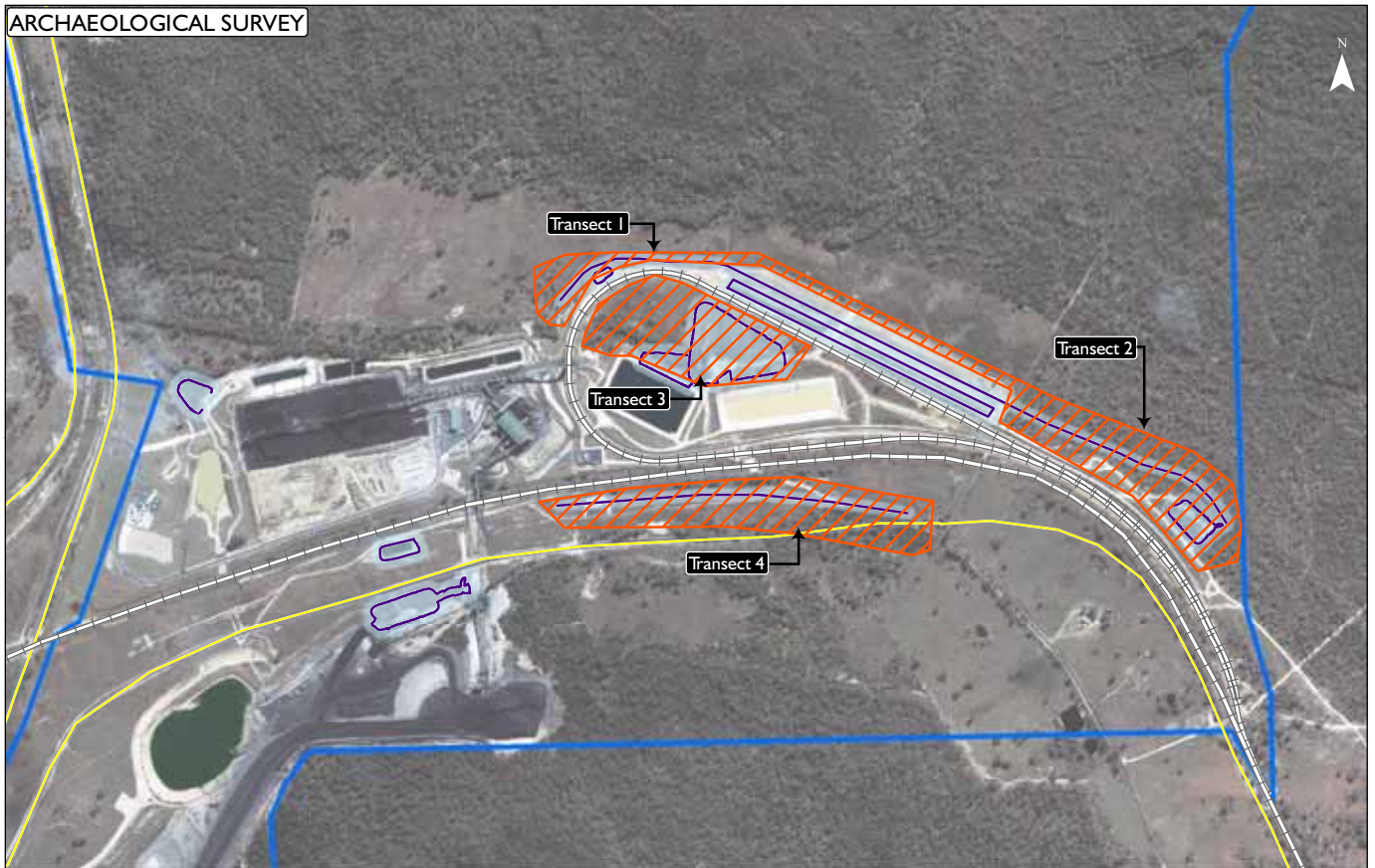
Figure 2



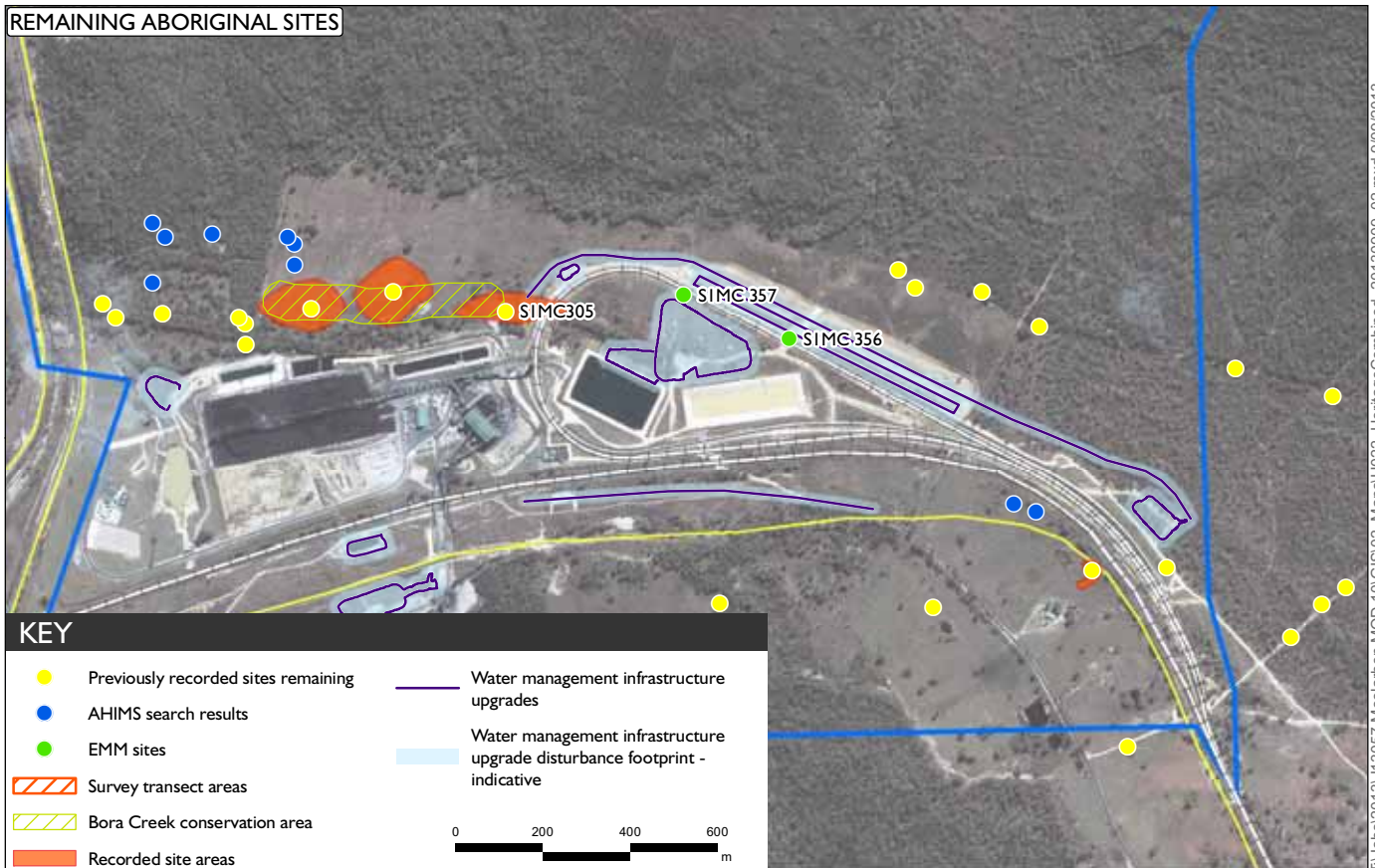




ARCHAEOLOGICAL SURVEY



REMAINING ABORIGINAL SITES



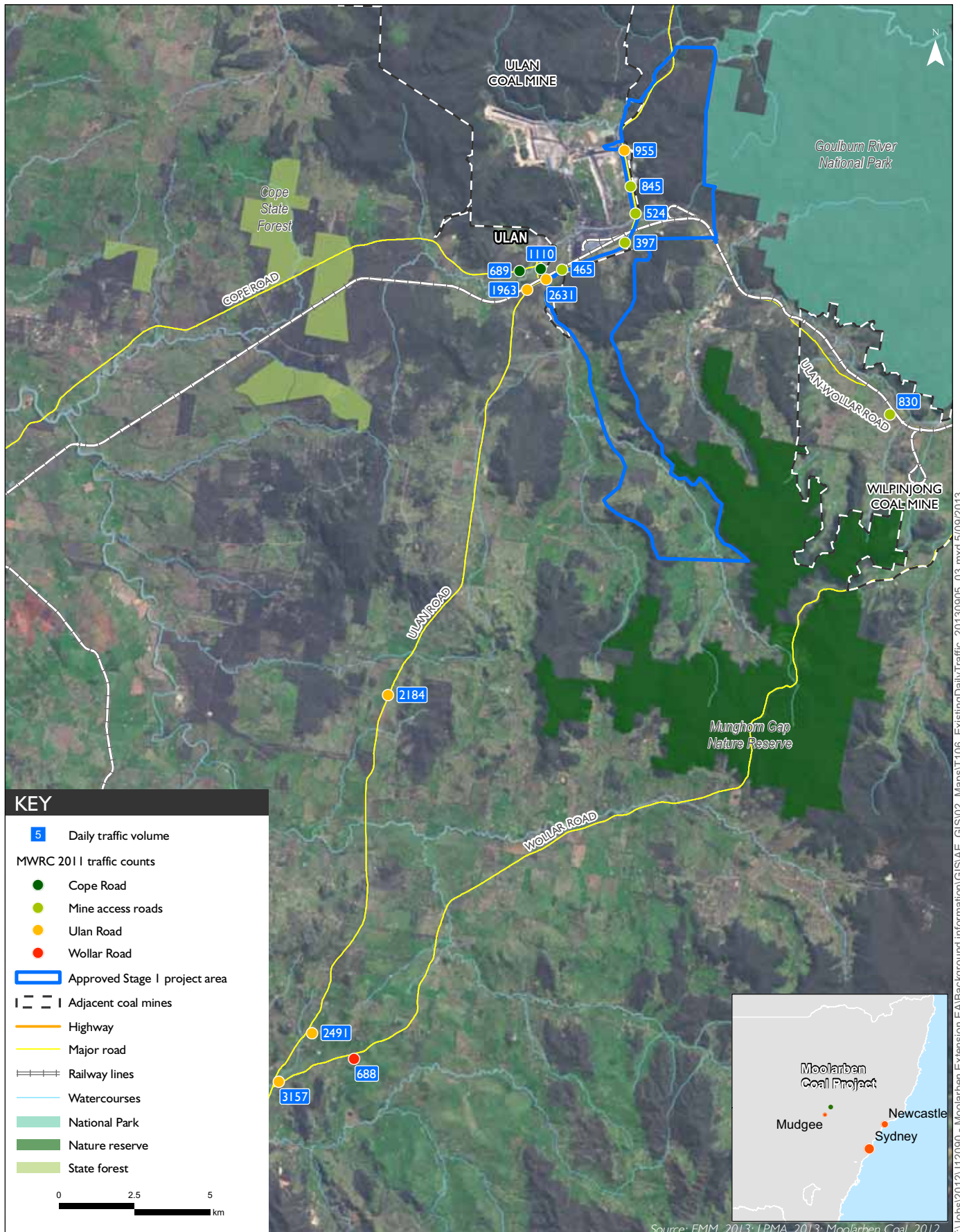
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Proposed Stage I surface water management infrastructure upgrades - Aboriginal heritage

Moolarben Coal Project - Stage I Optimisation Modification

Figure 4





Proposed Stage I surface water management infrastructure upgrades  
- existing daily traffic volumes

Moolarben Coal Project - Stage I Optimisation Modification

## Appendix E

### Biodiversity Offset Strategy and Proposed Offset Package

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# Revised Moolarben Coal Project Stage 1 - Optimisation Modification Project Biodiversity Offset Strategy and Proposed Offset Package

Prepared for  
**Moolarben Coal Operations Pty Limited**  
9 September 2013



**DOCUMENT TRACKING**

ITEM	DETAIL
Project Name	Moolarben Coal Project Stage 1 – Optimisation Modification Project Biodiversity Offset Strategy and Proposed Offset Package
Project Number	13MUDENV-0002
Project Manager	Daniel Magdi Phone 02 4302 1228 Mudgee NSW 2850
Prepared by	Jo Daley, Rebecca Dwyer, David Allworth, Brian Towle, Daniel Magdi, Steven Ward, Robert Humphries
Approved by	Robert Humphries
Status	Final
Last saved on	9 September 2013
Cover photo	Clockwise from top left: Narrow-leaved Ironbark – Grey Gum Shrubby Woodland (Moolarmoo property) DA 2013; Grey-crowned Babbler nest (Elward) DM 2013; Hollow-bearing Rough-barked Apple (Clifford property) DM 2013; Dwyer’s Red Gum low woodland (Property #5) DA 2013

This report should be cited as ‘Eco Logical Australia (2013). Revised *Moolarben Coal Project Stage 1 – Optimisation Modification Project: Biodiversity Offset Strategy and Proposed Offset Package*. Prepared for Moolarben Coal Operations Pty Limited.

**ACKNOWLEDGEMENTS**

This document has been prepared by Eco Logical Australia Pty Ltd

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# Abbreviations

ABBREVIATION	DESCRIPTION
BBAM	Biobanking Assessment Methodology
BGW	Box Gum Woodland (abbreviation for the TSC and EPBC Act listed ecological community 'White Box – Yellow Box – Blakely's Red Gum grassy woodland and derived native grassland')
BOS	Biodiversity Offset Strategy
BOP	Biodiversity Offset Package
CEEC	Critically Endangered Ecological Community
CMA	Catchment Management Authority
DECCW	former NSW Department of Environment, Climate Change and Water (now OEH)
DGRs	Director-General's Requirements
DNG	Derived Native Grassland
DSEWPac	Commonwealth Department of Sustainability, Environment, Water, Populations and Communities
DP&I	NSW Department of Planning and Infrastructure
EA Report	Ecological Assessment Report
EEC	Endangered Ecological Community
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
IBRA	Interim Biogeographic Regionalisation of Australia
LGA	Local Government Area
MCO	Moolarben Coal Operations Pty Limited
MCP	Moolarben Coal Project
MNES	Matters of National Environmental Significance (EPBC Act)
NPW Act	NSW <i>National Parks and Wildlife Act 1975</i>
OEH	NSW Office of Environment and Heritage
ROMP	Rehabilitation and Offset Management Plan
SSD	State Significant Development
TSC Act	NSW <i>Threatened Species Conservation Act 1995</i>

# Executive Summary

Moolarben Coal Operations Pty Limited (MCO) commissioned Eco Logical Australia (ELA) to prepare a Biodiversity Offset Strategy (BOS) and Biodiversity Offset Package (BOP) for the proposed Moolarben Coal Project Stage 1 – Optimisation Modification Project (the proposed modification) as described in the Ecological Assessment report (EA report) (EMM 2013). It is noted that no Director-General's Requirements (DGRs) have been issued for the proposed modification.

This BOS and proposed BOP have been prepared to accompany the EA for the proposed modification prepared by EMM (2013) and has been updated following public exhibition of the proposal to address issues raised by the NSW Office of Environment and Heritage (OEH).

The BOS is based on a direct impact area of 200.73 hectares (ha) of which 177.08 hectares comprises native vegetation and threatened species habitat in various states of condition (EMM 2013). The BOS has been prepared in recognition of the NSW Offsetting Principles (OEH 2008), the OEH Interim Policy on assessing and offsetting impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure projects (OEH 2011) and the EPBC Act offset guide (DSEWPac 2012).

The measures to avoid and mitigate the impacts of the proposed modification are outlined in the EA (EMM 2013). This report provides a detailed description of the proposed offset strategy to compensate for residual adverse ecological impacts. It uses 'maintain or improve' principles to inform the 'quantum' of offsets required consistent with OEH's Interim Offset Policy for Major Projects (OEH 2011).

The Interim Offset Policy for Major Projects uses a three-tiered approach to achieving offset outcomes. Tier 1 full 'Improve or Maintain' outcome, Tier 2 'Negotiated No Net Loss' outcome and Tier 3 'Mitigated Loss' outcome. The calculations indicate that to achieve a full Tier 1 improve or maintain offset outcome for impacts to vegetation and general biodiversity, an offset consisting of 'like for like' vegetation types as well as threatened species habitats in the order of 1,133 ha would be required. This would be reduced to 984 ha following successful rehabilitation of the mine site to pre-existing vegetation communities. However, as a 'red flag' community would be impacted (20.69 ha of White box- Yellow Box Grassy woodland on basalt slopes in the upper Hunter valley NSW), a Tier 1 offset cannot be achieved. Following investigation of potential offset sites that provide like for like biodiversity values, a **direct offset** package of 924 hectares of remnant and regenerating 'like for like' vegetation types and threatened fauna habitat is proposed.

As the offset properties do not provide the same proportions of vegetation types impacted, a Tier 2 or no net loss offset is not achieved, however the offset package includes vegetation types that match the credit profiles and are in the same vegetation formation as those being impacted and are thus consistent with the variation criteria for a Tier 3 offset. Collectively, these properties significantly exceed the Tier 3 minimum offset ratio of 2:1, have confirmed matching threatened fauna habitats and provide strategic areas of foothill dry sclerophyll forests that are important for threatened woodland birds and other fauna.

The proposed **direct** offset package involves permanent protection on title by the registration of a Conservation Covenant under s.69B of the *National Parks and Wildlife Act 1974* (or other similar conservation covenant or land transfer to national park estate with the agreement of the NSW Minister for the Environment) over 8 properties already owned by MCO.

In summary, the BOS and proposed BOP provide:

- A 'maintain or improve' quantification of the impacts of the proposed modification informed by the Biobanking Assessment Methodology (BBAM) for benchmarking purposes as required by the Major Projects Offset Policy (OEH 2011);
- Offset properties to be permanently protected on title via registration of a conservation covenant (or similar) where existing biodiversity values would be protected and enhanced; and
- Long term biodiversity management of these properties.

# 1 Biodiversity Offset Strategy

## 1.1 INTRODUCTION

Moolarben Coal Operations Pty Limited (MCO) operates the Moolarben Coal Project (MCP) approximately 40km north east of Mudgee. The MCP was approved by the Minister for Planning in September 2007, under Part 3A of the *Environmental Planning and Assessment Act 1979*. The MCP is located in the headwaters of the Goulburn River catchment within the broader Hunter-Central Coast Catchment Management Area (CMA) and is situated adjacent to the Goulburn River National Park and Munghorn Gap Nature Reserve.

MCO commissioned Eco Logical Australia (ELA) to prepare a Biodiversity Offset Strategy (BOS) to compensate for the non-avoidable impacts to native vegetation and threatened species habitats from the proposed modification to the MCP. The proposed modification is described in the Ecological Assessment report (EA report) which has been prepared in support of the modification application (EMM 2013).

This BOS is based on a direct impact area of 200.73 hectares (ha) of which 177.08ha comprises native vegetation and threatened species habitat in various states of condition (EMM 2013). The BOS has been prepared to provide *'a comprehensive offset strategy to ensure that the development maintains or improves the terrestrial and aquatic biodiversity values of the region in the medium to long term'* in general recognition of the NSW Offsetting Principles (OEH 2008) and the Office of Environment Heritage (OEH) Interim Policy on assessing and offsetting impacts of Part 3A, State Significant Development (SSD) and State Significant Infrastructure Projects (OEH 2011) (**Appendix A**).

The proposed modification is subject to a separate referral to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for impacts to Matters of National Environmental Significance (MNES), specifically, but not limited to, 19.89 ha of White Box – Yellow Box – Blakely's Red Gum grassy woodland and derived native grasslands (Box – Gum Woodlands) and is likely to be determined as a 'Controlled Action'.

The EPBC Act Offset Policy requires *'offset measures to be considered for residual impacts that cannot be mitigated to ensure the protection of MNES in perpetuity'*. This BOS has been prepared to generally be consistent with the EPBC Act Offset guide (DSEWPaC 2012).

The measures to avoid and mitigate the impacts of the proposed modification are outlined in Chapter 7 of the EA report prepared by EMM (2013). These measures include but were not limited to:

- The exclusion of Moolarben Creek from the proposed modification boundary to protect riparian zones and the special habitats that these areas provide;
- Maintaining connectivity between forested areas to the north and south of the project boundary;
- Gradual clearance of the proposed extension areas combined with pre-clearance fauna surveys to reduce impacts to native fauna including threatened species;

- Implementation of pest control measures in the proposed extension areas in accordance with a Landscape Management Plan;
- Salvage of habitat features important to threatened species for re-instatement within rehabilitation areas;
- Measure to reduce impacts to loss of rocky outcrop roosting habitat; and
- Rehabilitation of the proposed extension areas for biodiversity outcomes specifically re-creation of 'Box-Gum Woodlands' and sedimentary Ironbark forests.

This report provides a detailed description of the BOS which addresses the improve or maintain principles as required by the DP&I and OEH's offset policies for Major Projects (OEH 2011) and the EPBC Act Environmental Offset Policy (DSEWPaC 2012) respectively. The proposed BOS and BOP provides:

- A 'maintain or improve' quantification of the impacts of the proposed modification for benchmarking purposes informed by the Biobanking Assessment Methodology (BBAM) to guide the development of the offset strategy;
- Offset properties to be permanently protected via an appropriate conservation mechanism such as registration of a Conservation Agreement under s.69B of the *National Parks and Wildlife Act* (NPW Act) or other equivalent measure, including possible transfer to the national parks estate subject to the agreement of the NSW Minister for the Environment , to ensure the protection, enhancement and conservation management of biodiversity values; and
- long term biodiversity management of these properties.

## 1.2 OFFSET PRINCIPLES

The following principles for providing offsets against the impacts of the proposed modification have been used to guide the development of the BOS:

### NSW Offsetting Principles (DECC 2008)

1. Impacts must be avoided first by using prevention and mitigation measures.
2. All regulatory requirements must be met.
3. Offsets must never reward ongoing poor performance.
4. Offsets will complement other government programs.
5. Offsets must be underpinned by sound ecological principles.
6. Offsets should aim to result in a net improvement in biodiversity over time.
7. Offsets must be enduring and they must offset the impact of the development for the period that the impact occurs.
8. Offsets should be agreed prior to the impact occurring.
9. Offsets must be quantifiable and the impacts and benefits must be reliably estimated.

10. Offsets must be targeted.
11. Offsets must be located appropriately.
12. Offsets must be supplementary.
13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

### Commonwealth (DSEWPaC 2012)

Suitable offsets must:

1. Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action.
2. Be built around direct offsets but may include other compensatory measures.
3. Be in proportion to the level of statutory protection that applies to the protected matter.
4. Be of a size and scale proportionate to the residual impacts on the protected matter.
5. Effectively account for and manage the risks of the offset not succeeding.
6. Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action, see section 7.6).
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable.
8. Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

In assessing the suitability of an offset, government decision-making will be:

9. Informed by scientifically robust information and incorporate the precautionary principle in the absence of scientific certainty.
10. Conducted in a consistent and transparent manner.

The Commonwealth policy identifies two kinds of biodiversity offset, '**direct offsets**' including such measures as long-term protection of existing habitat and '**compensatory measures**' (indirect offsets) for such measures as implementing recovery plan actions or contributions to relevant research.

The proposed offset strategy has been designed to meet the principles of both the NSW and Commonwealth policies.

### 1.3 OFFSET APPROACH

ELA has investigated the availability and suitability of potential offset sites on behalf of MCO. This has included identifying lands with appropriate conservation values in proximity to the MCP including land owned by MCO, land for sale or landowners who had expressed interest in managing their properties for conservation, identifying where these lands have potential to provide 'like for like' vegetation and threatened species habitat (consistent with the provisions of the Major Projects Offset Policy), and where cost effective management can be implemented to improve the overall conservation value of the

land. Where possible, focus was directed to land adjacent to existing conservation areas including Goulburn River National Park, Munghorn Gap Nature Reserve and MCO's Stage 1 and proposed Stage 2 offsets (**Figure 1**), thereby adding to the overall extent and connectivity of conserved land in the area. The approach also focused on increasing the strategic value of MCO's offsets for the MCP in its entirety.



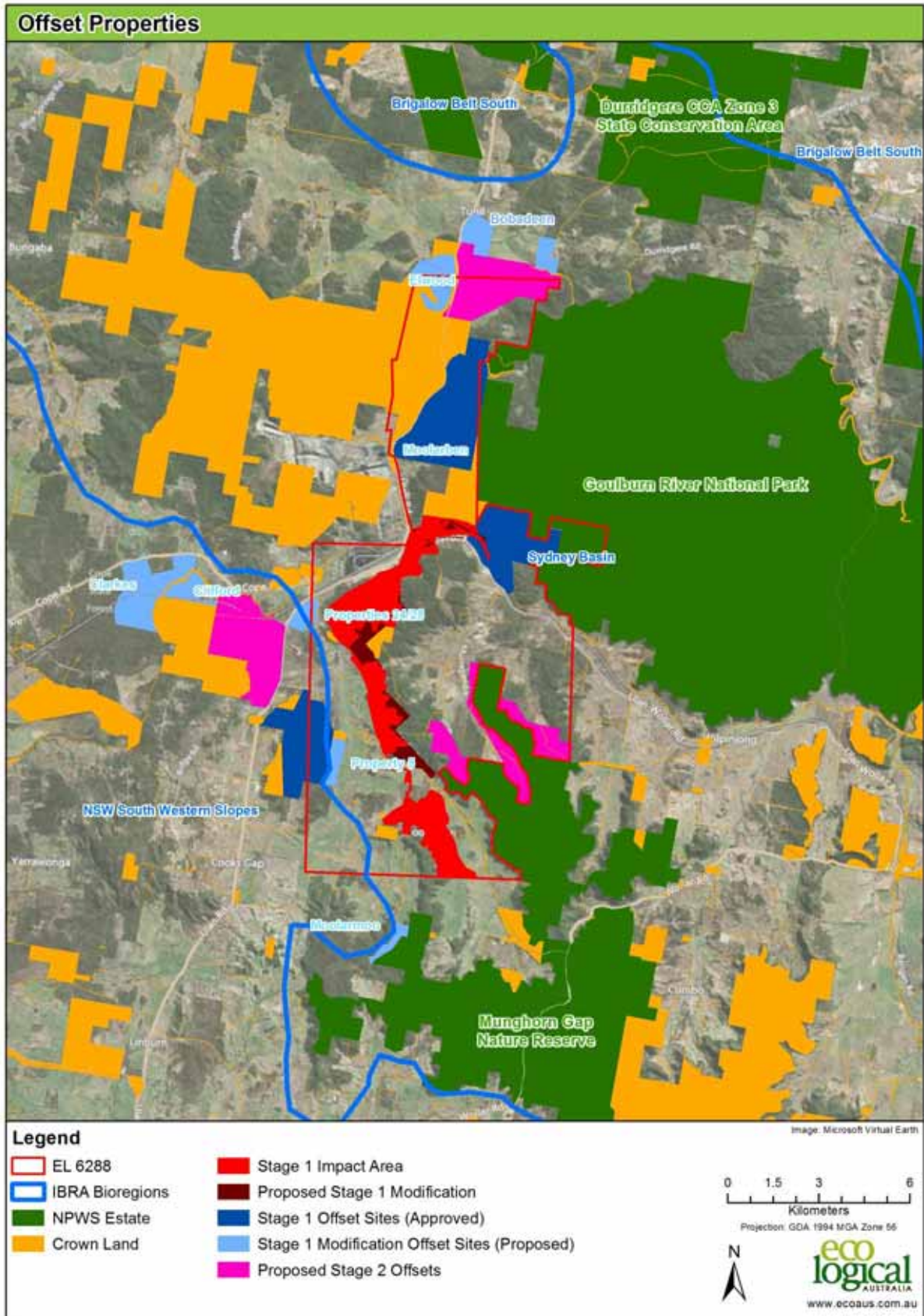


Figure 1: MCP Stage 1 Modification location, existing and proposed offset areas

#### 1.4 OFFSET REQUIREMENTS TO MEET AN IMPROVE OR MAINTAIN CONSERVATION OUTCOME (NSW)

The proposed modification involves an expansion of approved open cut mining areas and surface water management infrastructure upgrades that will result in the direct and indirect loss of up to 177.08ha of remnant native vegetation, including 20.69 ha of the NSW *Threatened Species Conservation Act* (TSC Act) listed endangered ecological community (White Box – Yellow Box- Blakely’s Red Gum woodland), of which 19.89 ha is consistent with the Commonwealth EPBC Act listed critically endangered community ‘White Box – Yellow Box – Blakely’s Red Gum grassy woodland and derived native grasslands’ (Box Gum Woodland), habitat for eleven threatened fauna species (Glossy Black Cockatoo, Turquoise Parrot, Grey-crowned Babbler, Scarlet Robin, Brown Treecreeper, Diamond Firetail, Speckled Warbler, Powerful Owl, Masked Owl, Eastern Bentwing-bat and Eastern Cave Bat) and potential habitat for several others threatened fauna species not recorded to date in the proposed modification area (EMM 2013 and **Table 1**). No threatened flora species were recorded in the proposed modification area (EMM 2013) despite three species being recorded in the Stage 1 (Moolarben Biota 2006) and Stage 2 (Ecovision Consulting 2008) assessments (*Diuris tricolor*, *Eucalyptus cannonii* and *Pomaderris queenslandica*).

The 20.59 ha of Box Gum Woodland consists of 13.29 ha of remnant woodland and 7.3 ha of derived native grassland (DNG) that meets the TSC and EPBC Act condition thresholds.

The OEH Interim Major Projects Offset Policy (OEH 2011) specifically acknowledges that proposals assessed as Major Projects under the EP&A Act do not have to meet the ‘maintain or improve’ standard which is required under the Biobanking Scheme however, the impacts should be quantified using the Biobanking Assessment Methodology (BBAM) for benchmarking purposes. The approach taken by MCO is consistent with this policy. The BBAM has been used to ‘inform’ the quantum of offset required, and whilst it is OEH’s preference that a Tier 1 ‘maintain or improve’ outcome is achieved, the policy provides a structured approach for assessing proposals that meet one or two alternative standards (Tier 2 “no net loss” and Tier 3 “mitigated loss”), which take into consideration the environmental, social and economic benefits provided by the proposed modification.

Accordingly, the BBAM was used to inform the ‘quantum’ of biodiversity offsets required to meet a ‘maintain or improve’ outcome. An informal Biobanking Assessment of the impact site has been undertaken by an accredited Biobank Assessor using a stratified biometric vegetation map of the impact area and eight (8) biometric plots collected by EMM (2013). The eight plots do not strictly meet the minimum requirements of the BBAM for the number of plots required, however provide a robust base on which to conduct the improve or maintain calculations. The results of this assessment are summarised in **Table 1** and indicate that 10,525 biodiversity credits are required to meet a full ‘improve or maintain’ outcome. Using the OEH credit converter which assumes the average biobank site will generate 9.3 credits per ha, this is equivalent to an offset area of 1,133 ha.

A second informal Biobanking Assessment was undertaken in accordance with Section 3.6.2 of the Biobanking Operational Manual (assess site value following rehabilitation/restoration of a development site) consistent with the commitment in the EA report (EMM 2013) to rehabilitate the mine site to the pre-existing native vegetation post mining. Mine site rehabilitation is a standard mitigation measure and is used to reduce the quantum of impacts by replacing some of the lost biodiversity following mining. The BBAM was used to calculate the number of credits generated by the rehabilitation of 177.47 ha (which includes small areas of cleared land within the impact area). The rehabilitation generates 1,388 credits at an average of 7.58 credits per hectare, and thus reduces the offset requirements from 10,526 credits to 9,181 (**Table 1**). It is noted that rehabilitation of the mine sites generates fewer credits than

enhancing existing areas of native vegetation to reflect the risks involved in rehabilitation. Using rehabilitation as a mitigation measure reduces the offset area required to 984 ha.

The eight threatened fauna species listed on the Schedules of the TSC Act recorded utilising habitats within the impact area do not require species credits and therefore do not require specific offset requirements under the BBAM or OEH (2011), however, proposed offset areas have been assessed for the presence of these and other threatened species to provide 'like for like' habitats to those being impacted consistent with Offset Principle 10.

A potential roost/breeding site for one threatened bat species recorded foraging in the project area was also identified in a rocky cliff line. Whilst the bat species using the site was not confirmed during the field assessment, the site was considered characteristic of the Eastern Cave Bat. A separate credit calculation was undertaken for this species as a precautionary measure to determine the offset requirements for this species. A nominal 1 ha of impact was entered into the tool to determine the offset ratio required. The area of the cave is actually less than 5m<sup>2</sup>. The calculation found that 13 credits are required for the impact to this nominal 1 ha for the area of the cave/overhang) which can be generated by two confirmed roosting/breeding sites of similar size (based on the default 6 credits generated per hectare of cave habitat protected).

No threatened plants have been recorded in the impact area despite targeted surveys (EMM 2013). Nineteen possible specimens of the threatened eucalypt *Eucalyptus cannonii* were recorded and specimens (where accessible) sent to the Royal Botanic Gardens (RBG) for confirmation. This species regularly hybridizes with the non-threatened and widespread Red Stringybark *Eucalyptus macrorhyncha* (NPWS 2000). The RBG confirmed that all specimens collected were the non-threatened Red Stringybark (**Appendix B**).

One of the vegetation types impacted (Box Gum Woodland) is a red flagged vegetation type under the BBAM (i.e. a vegetation type listed as an endangered ecological community and/or a vegetation type that is greater than 70 percent cleared in the CMA). Accordingly, a Tier 1 offset under OEH (2011) cannot be achieved. In these circumstances the Major Projects Offset Policy allows for a Tier 2 or 3 outcome.

The Biobanking assessments indicate that the offsets can be secured in a range of 'similar' vegetation types, across a number of CMA subregions and in accordance with the BBAM, meet the 'like for like' offset principle (Principle 10). Additionally, the variation criteria in the OEH major projects offset policy allows vegetation types in the same vegetation 'formation' in the same IBRA region to be used as offsets where a Tier 1 or 2 offset cannot be met (OEH (2011) Attachment B variation criteria "a").

#### 1.4.1 Assessment of potential offset properties

Preliminary biodiversity assessments of MCO owned properties were undertaken by ELA between February and July 2013 to confirm that they provided the biodiversity values required for the proposed modification (i.e. like for like vegetation types and threatened fauna records and/or habitat, in particular cave roosting/breeding bat habitat and records, equivalent to that being impacted) and that they were capable of being managed for improved biodiversity conservation outcomes in the long term (**Appendix C** and **Tables 2, 3** and **4**).

**Table 2** provides a summary of the vegetation types confirmed on each of the potential offset properties and whether each vegetation type is considered to be a 'matching' or 'like for like' vegetation type in accordance with OEH (2011) as informed by the BBAM credit profiles. **Table 3** provides a summary of the proportion of each vegetation type in a remnant woodland, woodland patch of DNG condition state.

**Table 2** shows that each of the vegetation types mapped on the proposed offset properties (other than the 3.73 ha of HU647 Tea-tree shrubland and 0.44 ha of HU548 Giant Stinging Tree – Fig dry subtropical rainforest) matches the vegetation type and/or vegetation formation criteria consistent with OEH (2011). The vegetation type with the largest offset requirement (HU552 Grey Gum – Narrow-leaved Ironbark woodland), a dry sclerophyll forest sub-formation vegetation type that provides important threatened fauna habitat, only has 218 ha of matching offset vegetation types (providing an offset ratio of 1.96:1), however, the offset package includes 594.75 ha of dry sclerophyll forest formation vegetation types for the collective 156.39 ha impacted, an offset ratio of 3.8:1. The endangered vegetation type (HU654 White Box – Yellow Box grassy woodland) has 324 ha of matching offset vegetation types, providing an offset ratio of 15.66:1 including DNG areas. If the DNG areas are excluded, the offset ratio is 8.06:1 (166.69 ha of BGW for 20.69 ha of impact). Overall the proposed offset properties provide an offset ratio of 5.22:1.

Of the 924 ha of mapped vegetation on the proposed offset properties, 211 ha (mostly on the Bobadeen and Property #24/25 properties) has been mapped as DNG, that is, the original native vegetation community now exists in a modified state due to past land management practices including tree/shrub removal and grazing. The quality of this DNG has been assessed by ELA ecologists and was found to be in 'biometric moderate to good' condition with a moderate to high species richness including gazing sensitive species. Although the areas have been grazed, all but 10-20 ha of the DNG on property #5 and Moolarmoo had not been subject to recent cultivation or pasture improvement practices and meet both the TSC and EPBC Act definition of BGW with the perennial ground cover being predominantly (greater than 50 per cent) native, 12 or more native understory species excluding grasses and at least one 'important' species (DEH 2006). The DNG areas are considered to meet a State 2B/3B after Rawlings et al. (2010). Large areas of DNG in poorer condition (e.g. the Clifford property) have been excluded from the area calculations in **Table 3**.

**Table 4** shows that collectively each of the potential offset properties either has confirmed records of the threatened fauna species being impacted or these species are likely to occur (to be confirmed by more detailed assessment). **Appendix D** provides further details of the species predicted to occur by the BBAM in each of the impact and offset area vegetation types. In addition, several threatened species, including two threatened flora species (*Acacia ausfeldii* and *Diuris tricolor*) and four threatened fauna species (Large-eared Pied Bat, Eastern False Pipistrelle, Southern Myotis and Yellow-bellied Sheath-tail-bat) that are not being impacted by the proposed modification have been recorded on the potential offset properties. It is likely that during the preparation of management plans and monitoring of these sites (see Section 3 Commitments) that other threatened species will be recorded.

Over 7.5 km of cliff line habitat providing potential roosting/breeding habitat for the Eastern Cave Bat and other cave roosting bats has been mapped on the Elward, Moolarmoo and Property #5 (**Figures 6-8, 11-12 and 16-17**) but no confirmed roost sites have been recorded to date. MCO have committed to undertake further assessments of the MCO Stage 1 and Stage 1 modification offset properties to confirm cave roosting bat sites. Cave roosting habitat features suitable for occupation by bats are a dynamic habitat feature of the landscape with sites being lost and formed over time due to weathering or other disturbances to the caves. Accordingly these species have evolved to adapt to these changes by using more than one site and being able to use alternative sites should past sites become unsuitable. The protection of 7.5 km of cliff line habitat provides opportunities for suitable sites to develop and be occupied over time.

In summary, the properties assessed:

- Collectively include all of the vegetation types impacted on a 'mitigated loss' basis consistent with OEH (2011) (Offset Principle 10);
- Are in close proximity to the impact area;
- Are strategically located adjacent to existing conservation reserves or biodiversity offset areas from previous mining projects providing strategic links and connectivity to these reserves;
- Are of a size, shape and condition conducive to long term conservation management (Offset Principle 5 and 11);
- Are not currently required under any existing legislative requirement to be actively managed for biodiversity conservation and thus also meet the "additionality" NSW offset principle (Principle 2 and 12).

Table 1: Summary of improve or maintain impact calculations used to inform the BOS

Vegetation Type	Area Impacted (ha)	Credits Required Stage 1 Mod	Credits Required/ha	Credits Generated for Rehabilitation*	Credits Required after Rehabilitation*	Offset Area (ha) Required	
						Minimum Outcome Tier 3 (2:1)	No net loss Outcome Tier 2**
Grey Gum - Narrow-leaved Stringybark - ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin	111.13	7,130	64.2	842	6,288	222.3	767
White Box - Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin	13.33	696	52.2	101	595	26.7	75
Rough-barked Apple grassy open forest on valley flats of the North Coast and Sydney Basin	2.86	195	69.0	68	127	5.7	21
Rough-barked Apple - Silvertop Stringybark - Ribbon Gum shrub/grass open forest on hills of the southern Nandewar Bioregion	29.07	1,289	44.3	221	1,068	58.1	139
White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW	20.69	1,215	58.7	156	1,059	41	131
<b>Total</b>	<b>177.08</b>	<b>10,525</b>	<b>59.3</b>	<b>1,388</b>	<b>9,152</b>	<b>353.8</b>	<b>1,133</b>

\*Assumes all impacted area will be rehabilitated, including cleared patches within, to previous vegetation types (183.14 ha rehabilitated at average 7.58 credits per ha (see rehabilitation credit report)).

\*\*Use average number of credits generated per ha as 9.3 (See OEH offset converter)

Table 2: Area of matching vegetation types on proposed offset properties

Impact Site (Moolarben)					Proposed Offset Properties										
Vegetation Type	Vegetation Formation	% Cleared in CMA	Area Impacted (ha)	Target Offset Area (Tier 2)	Like for like' vegetation types allowed (Incl Formation Matching**)	BBAM and/or Formation match	% Cleared in CMA	Clarke	Clifford	Elward	Property #5	Property #24 & 25	Old Bobadeen	Moolarmoo	Total
HU552 Grey Gum - Narrow-leaved Stringybark - ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin	Dry Sclerophyll Forests (Shrubby subformation)	70	111.13	767	HU552 Grey Gum - Narrow-leaved Stringybark - ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin	BBAM	70%							1.76	1.76
					HU537 Dwyer's Red Gum low woodland on exposed sandstone ridges of the upper Hunter Valley, Sydney Basin	BBAM	5%	10.10	3.61	5.07	16.36				35.14
					HU574 Narrow-leaved Ironbark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin	BBAM	5%		10.1	76.39	12.47			21.95	120.91
					HU608 Scribbly Gum - Brown Bloodwood woodland of the southern Brigalow Belt South	BBAM	5%	45.16	4.28	10.33					59.77
<b>Sub-total "like for like" offset vegetation for impacts to HU552</b>								<b>55.26</b>	<b>17.99</b>	<b>91.79</b>	<b>28.83</b>	<b>0</b>	<b>0</b>	<b>23.71</b>	<b>217.58</b>
HU653 White Box - Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter valley, Sydney Basin	Dry Sclerophyll Forests (shrub/grass subformation)	10	13.33	75	HU575 Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin	BBAM	35%	244.98					7.86		252.84
<b>Sub-total "like for like" offset vegetation for impacts to HU653</b>								<b>244.98</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7.86</b>	<b>0</b>	<b>252.84</b>
HU605 Rough-barked Apple grassy open forest on valley flats of the North Coast and Sydney Basin	Dry Sclerophyll Forests (Shrubby subformation)	65	2.86	21	HU605 Rough-barked Apple grassy open forest on valley flats of the North Coast and Sydney Basin	BBAM	65%								0.00
<b>Sub-total "like for like" offset vegetation for impacts to HU605</b>								<b>0.00</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0.00</b>
HU604 Rough-barked Apple - Silvertop Stringybark - Ribbon Gum shrub/grass open forest on hills of the southern Nandewar bioregion	Dry Sclerophyll Forests (shrub/grass subformation)	65	29.07	139	HU603 Rough-barked Apple - Silvertop Stringybark - Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast	BBAM	65%				10.93	60.1			71.03
					HU527 Caley's Ironbark - Currawang shrubby woodland on sandstone ridges of the upper Hunter Valley, Sydney Basin	Formation	5%			50.88			1.87	52.75	
<b>Sub-total "like for like" offset vegetation for impacts to HU604</b>								<b>0.00</b>	<b>0</b>	<b>50.88</b>	<b>10.93</b>	<b>60.1</b>	<b>0</b>	<b>1.87</b>	<b>123.78</b>

Impact Site (Moolarben)					Proposed Offset Properties											
Vegetation Type	Vegetation Formation	% Cleared in CMA	Area Impacted (ha)	Target Offset Area (Tier 2)	Like for like' vegetation types allowed (Incl Formation Matching**)	BBAM and/or Formation match	% Cleared in CMA	Clarke	Clifford	Elward	Property #5	Property #24 & 25	Old Bobadeen	Moolarmoo	Total	
HU654 White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW	Grassy Woodlands	90	20.69	131	HU654 White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW	BBAM	90%							134.39	18.48	152.87
					HU515 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands	Formation	80%		44.07	13.41	24.21	3.41	25.76			110.86
					HU551 Grey Box - Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin	Formation	70%	31.56	18.13	10.96						
<b>Sub-total "like for like" offset vegetation for Impacts to HU654</b>								<b>31.56</b>	<b>62.2</b>	<b>24.37</b>	<b>24.21</b>	<b>3.41</b>	<b>160.15</b>	<b>18.48</b>	<b>324.38</b>	
HU647 Tea-tree shrubland of drainage areas of the slopes and tablelands	Forested Wetland	20	0	0	HU647 Tea-tree shrubland of drainage areas of the slopes and tablelands					3.73						3.73
HU548 Giant Stinging Tree- Fig dry subtropical rainforest of the North Coast and Brigalow Belt South	Rainforest	70	0	0	HU548 Giant Stinging Tree- Fig dry subtropical rainforest of the North Coast and Brigalow Belt South									0.44		0.44
Cleared Land					Cleared Land			0.86	0.57							1.43
<b>Grand Total</b>			<b>177.08</b>	<b>1,133</b>				<b>332.66</b>	<b>80.76</b>	<b>170.77</b>	<b>63.97</b>	<b>63.51</b>	<b>168.01</b>	<b>44.5</b>		<b>924.18</b>

\*\* Major Projects Offset Policy Tier 3 variation criteria (a) allows converting one vegetation type for another vegetation type within the same vegetation formation and IBRA bioregion and still meet 'like for like' requirements



Table 3: Condition of vegetation on proposed offset properties

Area and Condition of Vegetation on Proposed Offset Properties																											
Biometric Vegetation Type	Clarke			Clifford			Elward		Property #5			Property #24 & 25			Bobadeen			Moolarmoo			Total			Grand Total			
	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG				
HU552 Grey Gum - Narrow-leaved Stringybark - ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin																					1.76			1.76	0.00	0.00	1.76
HU537 Dwyer's Red Gum low woodland on exposed sandstone ridges of the upper Hunter Valley, Sydney Basin	4.71	5.39	0.00	3.61				5.07	16.36															24.68	10.46	0.00	35.14
HU574 Narrow-leaved Ironbark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin				10.098			73.41	2.98	11.26		1.21										21.95			116.72	2.98	1.21	120.91
HU608 Scribbly Gum - Brown Bloodwood woodland of the southern Brigalow Belt South	42.48		2.68	4.28				10.33																46.76	10.33	2.68	59.77
	47.19	5.39	2.68	17.99	0.00	0.00	73.41	18.38	27.62	0.00	1.21	0.00	0.00	0.00	0.00	0.00	0.00	23.71	0.00	0.00	189.92	23.77	3.89	217.58			
HU575 Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin	227.23	10.82	6.93														7.86							235.09	10.82	6.93	252.84
	227.23	10.82	6.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.86	0.00	0.00	0.00	0.00	0.00	235.09	10.82	6.93	252.84			
HU605 Rough-barked Apple grassy open forest on valley flats of																								0.00	0.00	0.00	0.00

Area and Condition of Vegetation on Proposed Offset Properties																								
Biometric Vegetation Type	Clarke			Clifford			Elward		Property #5			Property #24 & 25			Bobadeen			Moolarmoo			Total			Grand Total
	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	
the North Coast and Sydney Basin																								
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HU603 Rough-barked Apple - Silvertop Stringybark - Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast									7.58		3.35	18.05	4.39	37.66							25.63	4.39	41.01	71.03
HU527 Caley's Ironbark - Currawang shrubby woodland on sandstone ridges of the upper Hunter Valley, Sydney Basin							50.88	0										1.87			52.75	0.00	0.00	52.75
	0.00	0.00	0.00	0.00	0.00	0.00	50.88	0.00	7.58	0.00	3.35	18.05	4.39	37.66	0.00	0.00	0.00	1.87	0.00	0.00	78.38	4.39	41.01	123.78
HU654 White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW																16.78	117.61	0.45	4.35	13.68	0.45	21.13	131.29	152.87
HU515 Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands				39.17	4.9		10.45	2.96	3.65	3.55	17.01	2.62		0.79	2.38	19.63	3.75				58.27	31.04	21.55	110.86
HU551 Grey Box - Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin	23.76	2.95	4.85	15.22	2.91		7.98	2.98													46.96	8.84	4.85	60.65

Area and Condition of Vegetation on Proposed Offset Properties																								
Biometric Vegetation Type	Clarke			Clifford			Elward		Property #5			Property #24 & 25			Bobadeen			Moolarmoo			Total			Grand Total
	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	Woodland	Woodland Patches	DNG	
	23.76	2.95	4.85	54.39	7.81	0.00	18.43	5.94	3.65	3.55	17.01	2.62	0.00	0.79	2.38	36.41	121.36	0.45	4.35	13.68	105.68	61.01	157.69	324.38
HU647 Tea-tree shrubland of drainage areas of the slopes and tablelands							3.73														3.73	0.00	0.00	3.73
HU548 Giant Stinging Tree- Fig dry subtropical rainforest of the North Coast and Brigalow Belt South																		0.44			0.44	0.00	0.00	0.44
Cleared Land			0.86			0.57															0.00	0.00	1.43	1.43
<b>Total Vegetation per Property</b>	<b>298.18</b>	<b>19.16</b>	<b>15.32</b>	<b>72.38</b>	<b>7.81</b>	<b>0.57</b>	<b>146.45</b>	<b>24.32</b>	<b>38.85</b>	<b>3.55</b>	<b>21.57</b>	<b>20.67</b>	<b>4.39</b>	<b>38.45</b>	<b>10.24</b>	<b>36.41</b>	<b>121.36</b>	<b>26.47</b>	<b>4.35</b>	<b>13.68</b>	<b>613.24</b>	<b>99.99</b>	<b>210.95</b>	<b>924.18</b>
	332.66			80.76			170.77		63.97			63.51			168.01			44.50			924.18			924.18

Table 4: Threatened fauna species recorded or predicted to occur at impact and offset sites

Also refer to Appendix D which provides a summary of the BBAM predicted species for each of the impacted and offset area vegetation types.

Scientific name	Impact Site (Moolarben Stage 1 Optimisation Modification)				Proposed Offset Properties						
	Common name	BBAM Predicted	Recorded on Site	Credit Type	Clifford	Clarke	Elwood	Property #5	Property #24/25	Bobadeen (Williams)	Moolarmoo
<b>Threatened Fauna (Assumed Present by BBAM, Confirmation of records in offset area not required)</b>											
<i>Burhinus grallarius</i>	Bush Stone-curlew	Yes	No	Ecosystem							
<i>Calyptorhynchus lathamii</i>	Glossy Black Cockatoo	Yes	Yes	Ecosystem	Likely	Likely	Likely	Yes	Likely	Likely	Likely
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Yes	Likely	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	Yes	No	Ecosystem							
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Yes	Likely	Ecosystem	Yes	Likely	Possible	Likely		Likely	Possible
<i>Circus assimilis</i>	Spotted Harrier	Yes	No	Ecosystem						Likely	Possible
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	Yes	Yes	Ecosystem	Likely	Likely	Yes	Likely		Likely	Likely
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Yes	Possible	Ecosystem						Possible	Possible
<i>Daphoenositta chrysoptera</i>	Varied Sittella	Yes	Likely	Ecosystem	Likely	Likely	Likely	Yes		Likely	Possible
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	Yes	No	Ecosystem	Yes	Likely	Likely	Likely		Likely	Likely
<i>Glossopsitta pusilla</i>	Little Lorikeet	Yes	Likely	Ecosystem						Likely	Likely
<i>Grantiella picta</i>	Painted Honeyeater	Yes	Likely	Ecosystem						Likely	Likely
<i>Hieraaetus morphnoides</i>	Little Eagle	Yes	No	Ecosystem	Likely	Likely	Possible			Likely	Possible
<i>Lathamus discolor</i>	Swift Parrot	No	Possible	Ecosystem	Possible	Possible	Possible			Possible	Possible
<i>Lophoictinia isura</i>	Square-tailed Kite	Yes	Likely	Ecosystem	No	No	No			Possible	Possible
<i>Melanodryas cucullata</i>	Hooded Robin	No	Likely	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	Yes	Likely	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat (foraging)	Yes	Yes	Ecosystem	Yes	Likely	Yes	Likely	Yes	Likely	Likely
<i>Myotis adversus</i>	Southern Myotis	No	No	Ecosystem			Yes	Likely		Possible	Possible
<i>Neophema pulchella</i>	Turquoise Parrot	Yes	Yes	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Ninox connivens</i>	Barking Owl	Yes	Possible	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Ninox strenua</i>	Powerful Owl	Yes	Yes	Ecosystem	Likely	Likely	Likely	Likely		Likely	Yes
<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat (south eastern form)	Yes	Likely	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Petaurus australis</i>	Yellow-bellied Glider	Yes	No	Ecosystem						No	Feed scars
<i>Petaurus norfolcensis</i>	Squirrel Glider	Yes	Possible	Ecosystem						Possible	Possible
<i>Petroica boodang</i>	Scarlet Robin	Yes	Yes	Ecosystem						Likely	Likely
<i>Phascolarctos cinereus</i>	Koala	Yes	Possible	Ecosystem						Possible	Possible
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	Yes	Yes	Ecosystem	Likely	Likely	Yes			Likely	Likely
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Yes	No	Ecosystem						Possible	Possible
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	Yes	Yes	Ecosystem	Likely	Likely	Yes	Likely	Yes	Likely	Likely
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Yes	Likely	Ecosystem	Likely	Likely	Yes	Likely		Likely	Likely
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Yes	Possible	Ecosystem	Likely	Likely	Likely			Likely	Likely
<i>Stagonopleura guttata</i>	Diamond Firetail	Yes	Yes	Ecosystem	Yes	Likely	Likely			Likely	Likely
<i>Tyto novaehollandiae</i>	Masked Owl	Yes	Yes	Ecosystem	Likely	Likely	Likely			Likely	Possible
<i>Vespadelus troughtoni</i>	Eastern Cave Bat (foraging)	Yes	Yes	Ecosystem	Likely	Likely	Likely	Likely		Likely	Likely
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Yes	Likely	Ecosystem	Likely	Likely	Likely			Likely	Possible
<b>Threatened Fauna (Requiring confirmation of records by BBAM to offset confirmed records in impact area)</b>											
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	Yes	Possible	Species							
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat (breeding)	Yes	Possible	Species			Potential	Potential			Potential
<i>Hoplocephalus bungaroides</i>	Broad-headed Snake	Yes	No	Species							
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat (breeding)	Yes	No	Species			Potential	Potential			Potential
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	Yes	Possible	Species							
<i>Vespadelus troughtoni</i>	Eastern Cave Bat (breeding)	Yes	Potential	Species			Potential	Potential			Potential

## 1.5 EPBC ACT OFFSET REQUIREMENTS

The DSEWPaC has recently released an EPBC Act 'offset assessment guide' (DSEWPaC 2012) that replaces the previous draft Commonwealth Offset policy (DEWHA 2007). The policy was finalised on 20 September 2012 and applies to any new referrals and variations to approval conditions from 2 October 2012 and any projects currently under assessment. Offsets are only relevant to EPBC Act approvals declared as a 'controlled action' and where there is likely to be a residual 'significant' impact (DSEWPaC 2012).

A referral for the proposed modification is currently being prepared for DSEWPaC.

It is likely that the DSEWPaC will conclude that the proposed action is a controlled action based on impacts to listed threatened species and communities, in particular, but not limited to, impacts to 19.89 ha of critically endangered 'Box Gum Woodlands' and loss of potential foraging habitat for the vulnerable Large-eared Pied Bat and endangered Spotted-tailed Quoll, Swift Parrot and Regent Honeyeater.

The DSEWPaC offset policy states that impacts should first be avoided and mitigated as offsets do not reduce the impacts of a proposed action. Offsets will not be considered until all reasonable avoidance and mitigation measures are considered. EMM (2013) outlines the measures taken to avoid and mitigate impacts to MNES including Box Gum Woodland and these are summarised in Section 1.1 of this report.

Direct offsets are to meet a minimum 90 per cent of the measurable environmental gain for the impacted protected matter. A conservation gain may be achieved by:

- Improving existing habitat for the protected matter;
- Creating new habitat for the protected matter;
- Reducing threats to the protected matter;
- Increasing the values of a heritage place, and/or;
- Averting the loss of a protected matter or its habitat that is under threat.

The delivery of offsets that establish positive social or economic co-benefits are encouraged such as increasing landscape connectivity, offsets that employ local indigenous rangers to undertake management actions or pay rural landholders to protect and manage land for conservation purposes.

The DSEWPaC policy states that offset packages should be developed in consultation with the Department and that if the Department is satisfied that the offset activities are suitable, the Department will consider the magnitude and composition of the proposed offset package. The Department will take a range of considerations at both the impact and proposed offset site(s) into account, including:

Matters to be considered at the impact site:

1. Presence and conservation status of protected matters likely to be impacted by the proposed action;
2. Specific attributes of the protected matter being impacted at a site, for example: the type of threatened species or ecological community habitat, the quality of habitat, population attributes such as recruitment or mortality, landscape attributes such as habitat connectivity, or heritage values;

3. Scale and nature of the impacts of the proposed action – including direct and indirect impacts; and
4. Duration of the impact (not of the action).

Matters to be considered at the offset site:

5. Extent to which the proposed offset actions correlate to, and adequately compensate for, the impacts on the attributes for the protected matter;
6. Conservation gain to be achieved by the offset. This may be through positive management activities that improve the viability of the protected matter or averting the future loss, degradation or damage of the protected matter;
7. Current land tenure of the offset and the proposed method of securing and managing the offset for the life of the impact;
8. Time it will take to achieve the proposed conservation gain;
9. Level of certainty that the proposed offset will be successful. In the case of uncertainty, such as using a previously untested conservation technique, a greater variety and/or quantity of offsets may be required to minimise risk;
10. Suitability of the location of the offset site. In most cases this will be as close to the impact site as possible. However, if it can be shown that a greater conservation benefit for the impacted protected matter can be achieved by providing an offset further away, then this will be considered.

From a review of the EPBC Act offset policy and the associated 'offsets assessment guide' ELA has generated suggested values for the attributes utilised in the offset calculator and provided justification for these below. These values are based on ELA's knowledge of the calculator tool and have been undertaken by Dr Steven Ward who has attended training sessions with the DSEWPaC on the application of the policy. We note that the policy states that the operation of the EPBC offset assessment guide is to be performed by expert users within the Department, but provide the suggested values based on our experience and knowledge of the proposed offset sites.

We note that under the EPBC Act Environmental Offsets Policy consideration of offsets is only required for MNES where there remains a residual significant impact after avoidance and mitigation measures. For the proposed modification, significant impacts are only anticipated to occur on *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland), which is listed as a Critically Endangered Ecological Community under the EPBC Act. Nevertheless, from discussion with DSEWPaC staff it is understood that the assessment of offset requirements will likely be requested for other species. On this basis, and not pre-empting the EPBC Act referral above, the offset calculations have also been undertaken for impacts to potential foraging habitat of Large-eared Pied Bat, Spotted-tailed Quoll, Swift Parrot and Regent Honeyeater.

Accordingly, impacts for each Commonwealth listed species has been entered into the EPBC Act offsets calculator, together with informed values/estimates for 'Habitat Context', 'Start Condition', 'Stocking Rate', 'Future Condition with Development' (assuming mine site rehabilitation), to obtain a 'Total Quantum of Impact' (**Table 4**).

In order to meet the EPBC Act offset requirements, the calculated 'Net Present Value' of the proposed offset sites must exceed the 'Total Quantum of Impact' value.

Habitat scores were generated by combining scores for context, condition, and species stocking rate. For Box Gum Woodland the habitat scores were based on 50% context and 50% condition, whilst for threatened species habitat scores were based on 30% context, 30% condition and 40% species stocking rate. Following the offset assessment guide requirements a rounding function was used to convert the numbers generated to a whole integer out of 10.

The habitat scores for impact sites all used a context component score of 6/10, as the sites are in a landscape context that has had clearing for agriculture and is adjacent to large open cut mine. Accordingly, the condition of vegetation at the impact site was rated from between 4-8/10 for woodland and DNG areas and 4/10 (Spotted-tailed Quoll) to 8/10 for Large-eared Pied Bat, Swift Parrot and Regent Honeyeater on the basis of habitat quality and likelihood of use from nearby records.

At the offset sites, the habitat context component ranged from 5/10 to 9/10, as the sites had limited grazing history over most parts and were adjacent to existing national parks and/or previously approved offset areas. Habitat condition ranged from 3/10 for DNG areas to 8/10 for intact woodland areas, similarly habitat stocking rates for the subject threatened species ranged from 0/10 for DNG areas to between 5 and 8/10 for woodland areas.

The risk-related time horizon was set at 20 years (the maximum cap), as it is assumed that the impact associated with the proposed mine will be permanent (a conservative assumption given the commitment to rehabilitate the mine to pre-existing conditions and the ecological offsets will also be permanent). The time until ecological benefit was set at 10 years for woodland areas and 20 years for DNG area, to allow time for the woodland vegetation community response (and associated improvement in species habitat). Risk of loss of woodland areas was set at 20% as all of the offset sites are currently used for grazing and the risk of loss of the DNG vegetation was set at 40% as there is a substantially higher risk that these areas will continue to be degraded by agriculture to the point where the native vegetation component is lost. The risk of loss with the offset was set at 1% as the proposed conservation covenants provides the highest level of conservation security in NSW outside national parks and can only be terminated by the Minister for the Environment.

**Table 4** indicates that for each of the MNES impacted, the proposed offset package exceeds the offset requirement, ranging from 104 to 725%.

**Table 5: Offset measures for impacts and potential impacts on Matters of NES (EPBC Act)**

IMPACT AREA ATTRIBUTES			OFFSET SITE ATTRIBUTES		
IMPACT SITE	AREA OF IMPACT (ha)	TOTAL QUANTUM OF IMPACT	AREA	FINAL NPV SCORE	% OF IMPACT OFFSET
White-Box Yellow Box (Woodland)	12.59	5.04	110.89	5.26	104
White-Box Yellow Box (DNG)	7.3	2.19	152.84	6.8	310
Large-eared Pied Bat (Potential Habitat)	177.1	123.97	918.68	181.99	147
Spotted-tailed Quoll (Potential Habitat)	155.8	77.9	592.2	143.23	184
Regent Honeyeater and Swift Parrot (Potential Habitat)	33.89	23.72	847.55	171.99	725

## 2 Proposed Offset Package

It is proposed that the 8 properties already owned) by MCO (shown in **Figure 1** and summarised in **Table 6**) will comprise the offset package.

A Rehabilitation and Offset Management Plan (ROMP) will be prepared to guide the management, monitoring and reporting of the effectiveness of the offset areas. Combined, these 8 properties provide a direct offset of 924 ha and an offset ratio of 5.22:1 (Offset : Impact).

**Table 6: Name and area of mapped native vegetation of each offset property**

Property	Lot/Dps	Property Area	Vegetation Condition			
			Woodland	Scattered	DNG	Total
Clarke		332.66	298.18	19.16	15.32	332.66
Clifford	Lot 288 DP 704081	102.51	72.38	7.81	0.57	80.76
Elwood	Lot 84 DP 704077	170.77	146.45	24.32		170.77
Property # 5	Lot237 DP 755442	63.97	38.85	3.55	21.57	63.97
Property # 25 & 25	Lot 31 DP 633148, Lot 8 DP 626648	63.51	20.67	4.39	38.45	63.51
Bobadeen	Lot 5 DP750736, Part Lot 1 DP 593639, Lot 1 DP110465, Part Lot 6 DP 750736, Lot 5 DP 750750, Lot 2, 3, 4 & 5 DP111560	826.42	10.24	36.41	121.36	168.01
Moolarmoo	Lots 184 & 221 DP 755442	44.50	26.47	4.35	13.68	44.50
<b>Total</b>		<b>1,604.34</b>	<b>613.24</b>	<b>99.99</b>	<b>210.95</b>	<b>924.18</b>

A comparison of the mapped vegetation types (**Figures 2-8**) with those being impacted and the threatened species habitat has been undertaken in accordance with the Offset Principles and Major Projects Offset Policy (OEH 2008, 2011). Each property investigated has 'like for like' or matching vegetation types at the formation level, suitable habitat for the impacted threatened species and also contribute to regional conservation priorities and landscape connectivity (**Figure 1, Table 2 and Appendix C**). The offset package includes relatively small areas of highly disturbed or poor quality vegetation (10-20 ha on Property #5 and Moolarmoo).

Of the 924 ha of mapped vegetation, it is all in biometric moderate-good biometric condition, including approximately 210 ha of DNG and all but 4.17 ha provides matching 'like for like' or 'better' conservation values.

In particular, the properties include 324 ha of equivalent vegetation types to the 13.29 ha of White Box – Yellow Box grassy woodland and 7.3 ha of DNG being impacted including 153 ha of HU654 White Box –Yellow box grassy woodland (22 ha in woodland condition, 111 ha of HU515 Blakely's Red Gum –



Yellow Box –grassy woodland (89.31 ha in woodland condition) (equivalent to the NSW and Commonwealth listed Box Gum Woodland) and 61 ha of HU551 Grey Box-Narrow-leaved ironbark shrubby woodland (equivalent to the NSW listed EEC Central Hunter Grey Box – Ironbark woodland in the NSW North Coast and Sydney Basin Bioregions) providing an offset ratio of 15.66:1 for impacts to this EEC (or 8.06:1 if the DNG component is excluded).

In addition, the preliminary fauna assessment undertaken by ELA at each of the proposed offset properties (**Table 4** and **Appendix C**) has confirmed records (or potential habitat) for each of the impacted threatened fauna species and confirmed and potential habitat for various other threatened fauna species.



Figure 2: Mapped vegetation of the Clifford property

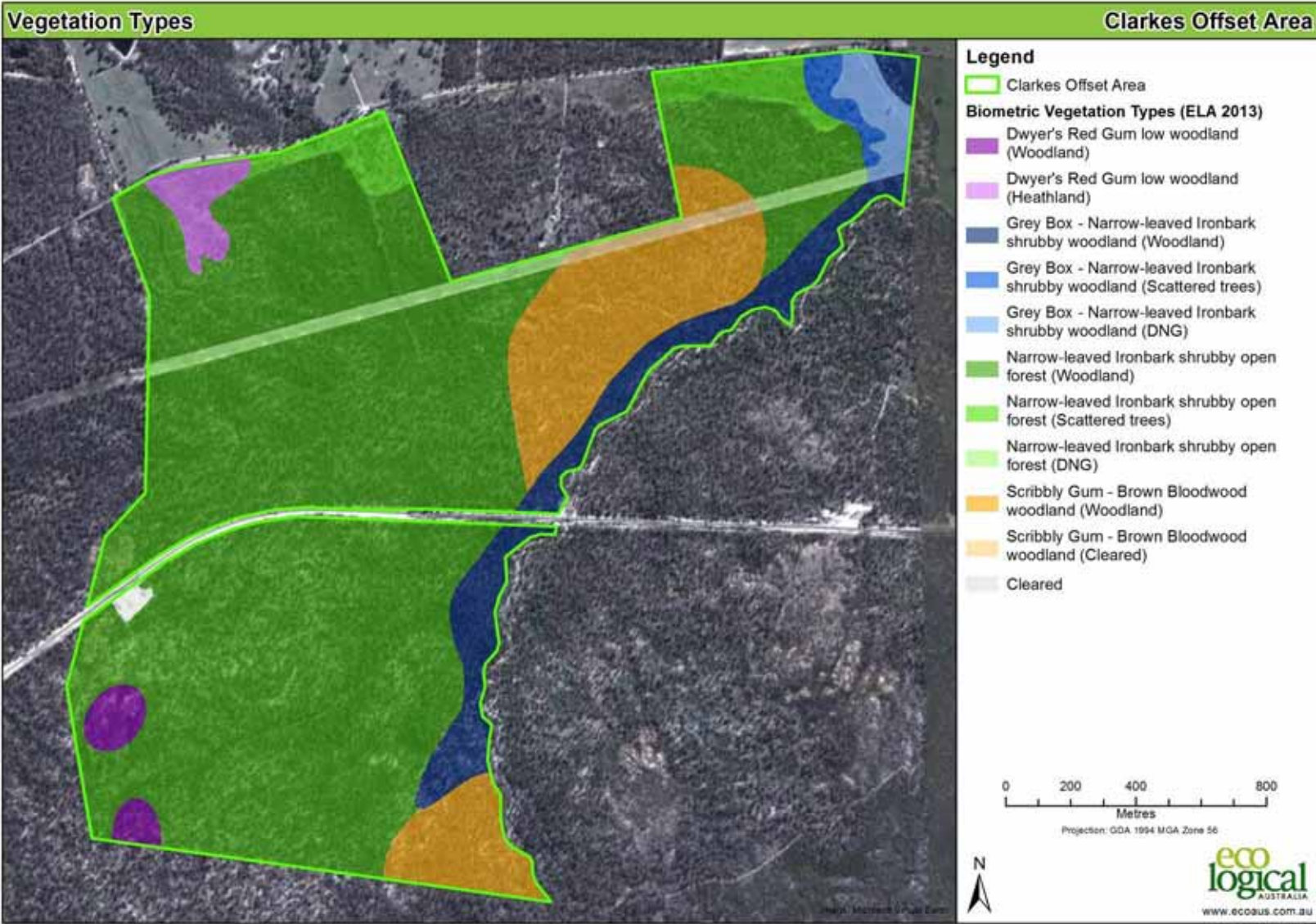


Figure 3: Mapped vegetation of the Clarkes property



Figure 4: Mapped vegetation of the Bobadeen property

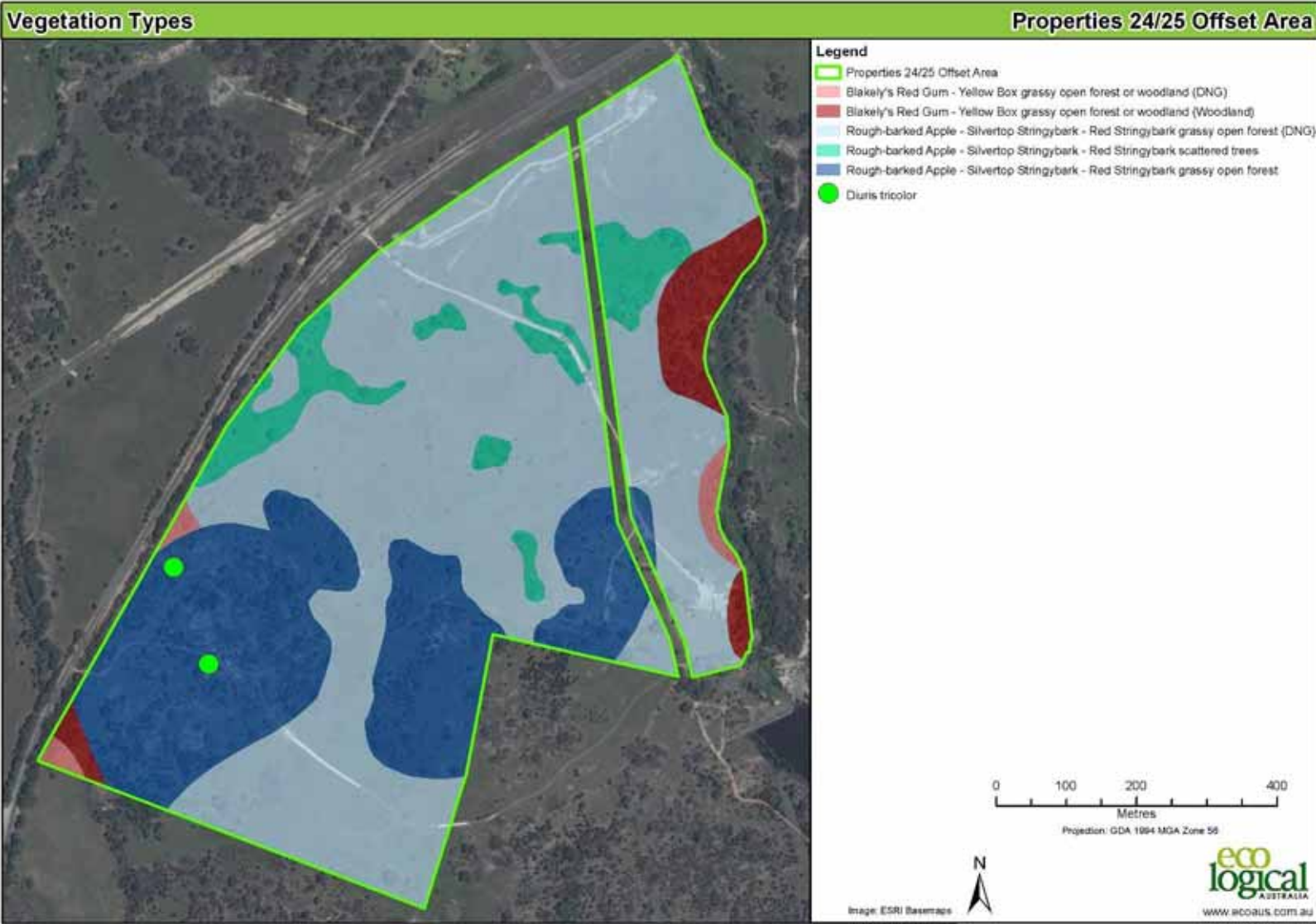


Figure 5: Mapped vegetation of properties #24 and 25

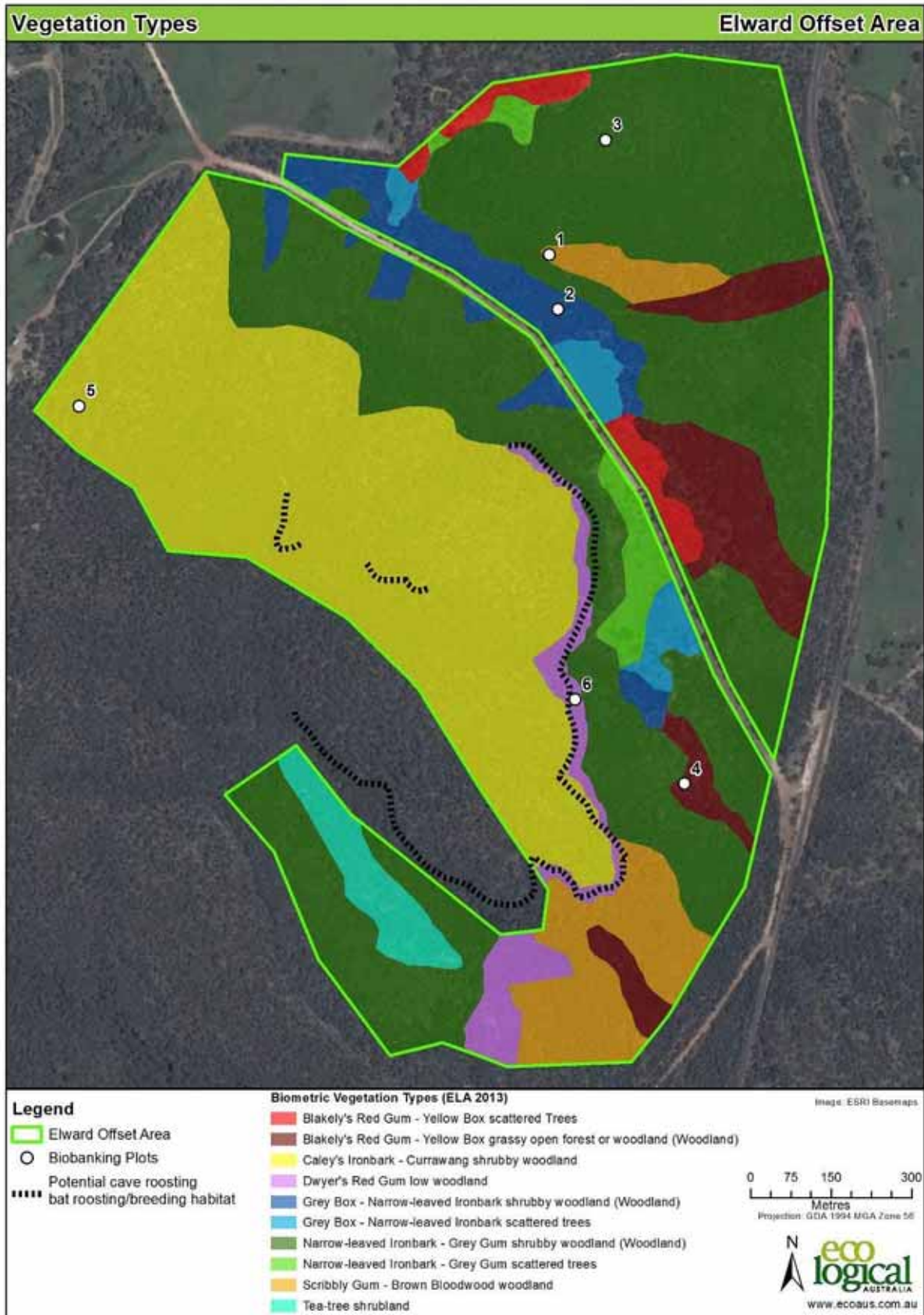


Figure 6: Mapped vegetation of the Elward property

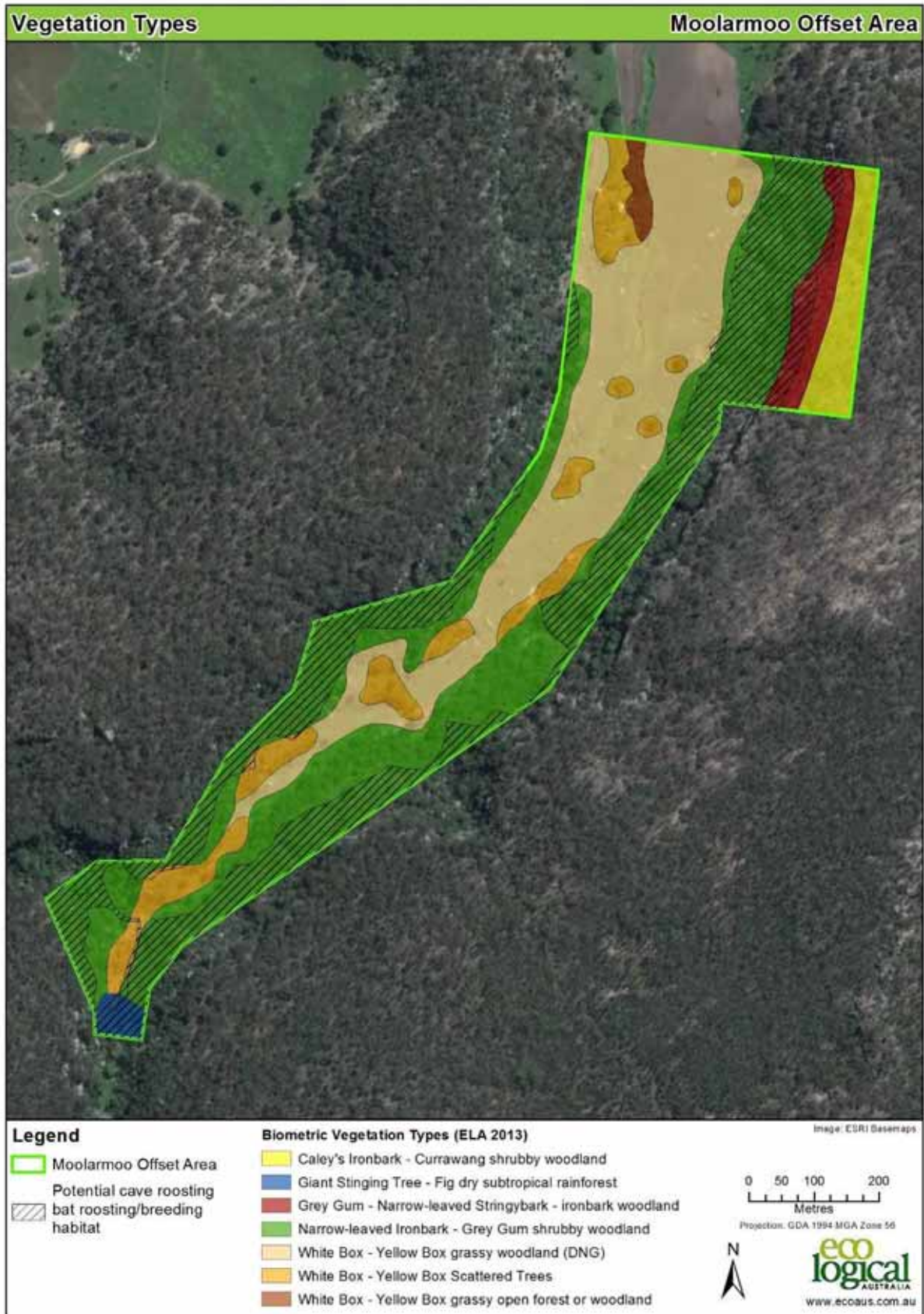


Figure 7: Mapped vegetation of the Moorlamoo property

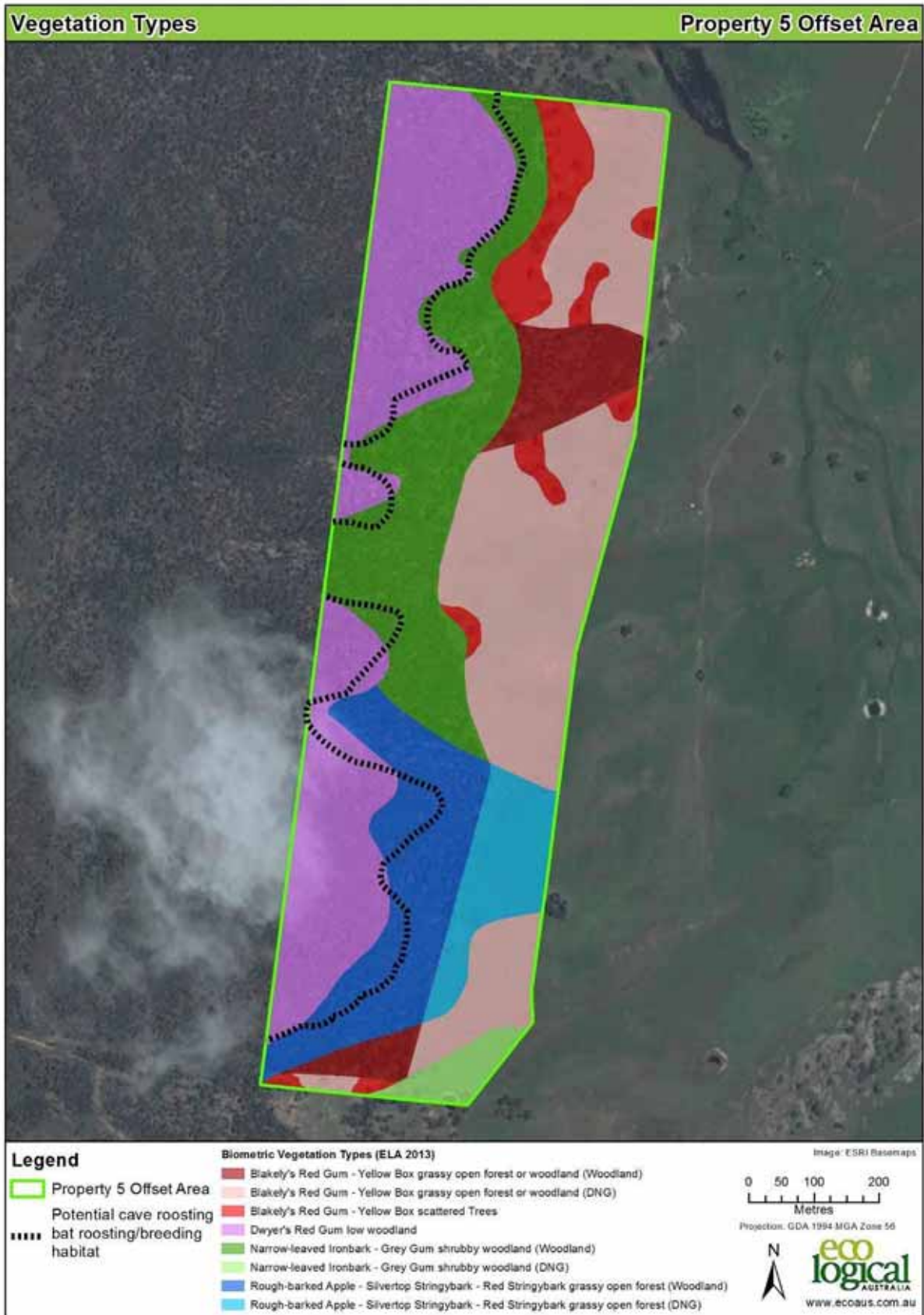


Figure 8: Mapped vegetation of property #5



## 2.1 CONSISTENCY WITH NSW OFFSET PRINCIPLES

The following section assesses the proposed offset package compared with the NSW offsetting principles (OEH 2008).

*1. Impacts must be avoided first by using prevention and mitigation measures.*

Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

A number of avoidance and mitigation measures have been considered in the design of the proposed modification (see Section 1.1 of this report and EMM (2013)). These measures have reduced impacts to native flora and fauna as much as possible within the context of an extractive resources project where to avoid all impacts would not allow resource recovery. Any unavoidable residual impacts will be offset (as outlined in this report).

*2. All regulatory requirements must be met.*

Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).

The development proposal has been prepared as a Part 3A Project Modification under s.75W of the EP&A Act 1979.

*3. Offsets must never reward ongoing poor performance.*

Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.

The proposed offset areas have not been mismanaged in order to increase their value. On the contrary, past sensitive grazing management of the proposed offset properties has resulted in these properties maintaining high biodiversity conservation values that will be protected and enhanced as a result of the proposed offset package.

*4. Offsets will complement other government programs.*

A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.

The proposed offset package will compliment other government programs by adding to and enhancing the conservation values of adjacent national parks and protecting links and wildlife corridors between these areas and existing biodiversity offset areas resulting from other mining projects (see **Figure 1**).

*5. Offsets must be underpinned by sound ecological principles.*

They must:

- Include the consideration of structure, function and compositional elements of biodiversity, including threatened species
- Enhance biodiversity at a range of scales

- Consider the conservation status of ecological communities
- Ensure the long-term viability and functionality of biodiversity.

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

The proposed offset package has been informed using OEHs quantitative assessment methodologies consistent with OEH (2011). It has been specifically targeted to address the communities and species being impacted on a 'like for like or better' basis and the properties identified in the proposed offset package have been selected based on their size, location and condition to achieve a viable conservation area. The proposed package includes the funding of and implementation of a range of biodiversity management actions that will legally protect, enhance and maintain the condition of existing habitat in the long term as well as facilitate the regeneration of areas of derived native grasslands.

*6. Offsets should aim to result in a net improvement in biodiversity over time.*

Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.

Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.

Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.

The proposed offset areas are substantially larger than the area to be impacted (with an offset to impact ratio of 5.39:1) and have been determined using quantitative methods to significantly exceed a mitigated loss outcome as described in OEH (2011). Offset areas will be secured prior to impact occurring with management commencing and ongoing after the areas are secured. Funding for long term management will be provided by MCO.

*7. Offsets must be enduring & they must offset the impact of the development for the period that the impact occurs.*

As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.

Offset areas will be protected on title and managed with secure funding in the long term.

*8. Offsets should be agreed prior to the impact occurring.*

Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal

commitments to the offset actions should be entered into prior to the commencement of works under approval.

The proposed offset package forms part of the environmental assessment for the proposed modification and it is understood and accepted that they will become conditions of approval, i.e. the offsets will be agreed and approved prior to the impact occurring.

*9. Offsets must be quantifiable & the impacts and benefits must be reliably estimated.*

Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:

- The area of impact
- The types of ecological communities and habitat/species affected
- Connectivity with other areas of habitat/corridors
- The condition of habitat
- The conservation status and/or scarcity/rarity of ecological communities
- Management actions
- Level of security afforded to the offset site.
- The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:
  - They protect land with high conservation significance
  - Management actions have greater benefits for biodiversity
  - The offset areas are not isolated or fragmented
  - The management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).
  - Management actions must be deliverable and enforceable.

The offset package has been informed by the improve or maintain calculations referred to in OEH's Major Projects Offset policy and has taken into consideration the area of impact, the vegetation types and condition, species, and connectivity. The calculations for the proposed offset areas have also taken into consideration area, the vegetation types and condition, species, connectivity, level of protection and required management actions. The offset areas are not isolated or fragmented and will be managed for biodiversity in the long term and secured via a conservation agreement registered on title (or similar mechanism) or by gazettal as an addition to existing national park (subject to the agreement of the NSW Minister for the Environment).

*10. Offsets must be targeted.*

They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.

The proposed offset package has been targeted based on a '*like for like or better*' conservation outcome and is consistent with OEH (2011) interim policy on assessing and offsetting biodiversity impacts of major projects. The proposed offset package meets a Tier 3 mitigate net loss outcome under variation criteria 'a'.

*11. Offsets must be located appropriately.*

Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.

The offset areas are either located adjacent to existing national parks or nature reserves or already approved or proposed offset areas. Combined with existing offsets and adjacent national parks and crown reserves, the proposed offsets form large patches of native vegetation that combine the same ecological characteristics of the impact area.

*12. Offsets must be supplementary.*

They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.

The proposed offset package is supplementary. The offset properties are currently zoned rural and have been used historically for agricultural productivity including grazing and timber collection and permit ongoing rural activities. The properties have no existing obligation to be managed for biodiversity conservation, therefore all management actions applied will be supplementary or additional to existing requirements.

*13. Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.*

Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.

The delivery of the proposed offset package will be enforceable through a conditions of approval.

## **2.2 CONSISTENCY WITH EPBC OFFSET POLICY**

The proposed offset package addresses the principles for offsets and the matters to be considered outlined in DSEWPac (2102). In particular, the proposed package:

- Utilises a quantitative assessment approach using the recently released EPBC Act offset calculator. The 'Net Present Value' of the proposed offset properties exceeds the 'Total Quantum of Impact' value for each of the MNES impacted by the proposal;
- Is built around direct offsets;
- Is proportionate to the level of statutory protection that applies to the protected matter;
- Is targeted to the EPBC Act matters being impacted (White Box – Yellow Box Blakely's Red Gum grassy woodland and derived native grasslands and habitat for the Large-eared Pied Bat, Regent Honeyeater, Swift Parrot and Spotted-tailed Quoll);
- Is of a size and scale proportionate to the residual impacts on the protected matter;
- Addresses the risk of the offset not succeeding by ensuring that the offsets are in place prior to the impact occurring, have existing biodiversity values that can be enhanced with a low risk of failure and provides for long term protection and management of these values; and
- Provides offsets that are additional to what is already required as the land proposed to provide the offset is currently rural land with no requirement for active conservation management.

In addition, the offset package:

- Will be agreed to prior to impact;
- Is in close proximity to the impact site; and
- Will be enforceable, monitored and audited in accordance with project approval conditions.

The cost to secure and manage the proposed offset package is estimated to be in the range of \$4M-\$5M (land value, registration of conservation covenants, flora and fauna inventories, preparation of management plans, annual monitoring and long term management costs).

### 3 Statement of Commitments

This biodiversity offset strategy and proposed offset package is MCO's offset commitment for the proposed modification.

In line with the contents of this document, MCO will:

1. Prepare and register a Conservation Covenant under Section 69B of the *National Parks and Wildlife Act 1974* (or equivalent conservation protection measure including the option to transfer land to the Minister for the Environment with agreement) to cover all eight properties referred to in Section 2 and **Table 6** to provide long term protection of the offset areas following approval of the proposed modification;
  - Should any of the nominated properties not be available for long term conservation protection, alternative offset sites of equivalent area and biodiversity values required by this BOS will be identified, and secured for long term conservation protection;
2. Undertake a detailed flora and fauna inventory and mapping of the vegetation types and threatened species present on each offset property, including the identification of Eastern Cave Bat roosting/breeding habitat, and identify the management issues to prepare a Rehabilitation and Offset Management Plan (ROMP) for the total offset package as a whole (with incorporation into the Stage 1 ROMP);
3. Prepare a ROMP that includes each property and clearly outlines the responsible parties for the implementation of the plan, the works required to improve and maintain the biodiversity values (including but not restricted to fire management, weed and feral animal control, erosion and sediment control, restrictions on access, revegetation), performance criteria and a reporting and monitoring program. The management plan will be prepared by MCO and reviewed by an appropriately qualified and experienced ecologist and will be incorporated into a single management plan covering the already approved Stage 1 offsets;
4. Implement the management actions specific to each property and provide an annual report on the implementation of the plan and the results (changes in biodiversity values) to the DP&I/OEH and DSEWPaC;
5. Provide adequate funds to implement the management plan on an annual basis; and
6. Arrange for the independent review of the adequacy and implementation of the conservation management plans every 3 years.

# References

- DECC (2008) *Principles for the use of biodiversity offsets in NSW*. Online <http://www.environment.nsw.gov.au/biocertification/offsets.htm> (Accessed 22 July 2009)
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- DSEWPaC (2012) *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*. Australian Government Department of Sustainability, Environment, Water, Population and Communities, Canberra, October 2012.
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- Ecovision Consulting (2008) Moolarben Coal Proposed Modification Stage 2 Ecological Impact Assessment. Report to Moolarben Coal Pty Ltd.
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- Moolarben Biota (2006) Moolarben Coal Project Appendix 11: Flora, Fauna and Aquatic Ecology Assessment. Report to Moolarben Coal Pty Ltd.
- NSW National Parks and Wildlife Service (NPWS) (2000) Environmental Impact Assessment Guidelines, *Eucalyptus cannonii*, NSW National Parks and Wildlife Service, Hurstville, May 2000.
- OEH (2011) *NSW OEH Interim policy on assessing and offsetting biodiversity impacts of Part 3A, State significant development (SSD) and State significant infrastructure (SSI) projects*. NSW Office of Environment & Heritage, Sydney, 25 June 2011.
- Rawlings, K., Freudenberger, D. & Carr, D. (2010) *A Guide to Managing Box Gum Woodlands*, Department of the Environment, Water, Heritage and the Arts, Canberra, ACT.

# Appendix A: OEH Interim Policy on assessing and offsetting biodiversity impacts of Part 3A, state significant development and state significant infrastructure projects



## NSW OEH interim policy on assessing and offsetting biodiversity impacts of Part 3A, State significant development (SSD) and State significant infrastructure (SSI) projects

Approved by the Chief Executive Officer 25 June 2011

### 1 Introduction

Offsetting is one practical tool for decision makers who have to balance the relative environmental, social and economic merits of development proposals under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The NSW Office of Environment and Heritage (OEH) has developed the Biobanking Scheme to provide a structured, market driven approach to offsetting. The Biobanking Scheme requires proposals to meet the 'improve or maintain' standard, and is based on sound science and robust, transparent rules.

The Biobanking Scheme is voluntary and many proposals in NSW are assessed outside the Scheme. The majority of these proposals have been assessed by the Department of Planning and Infrastructure (DP&I) as major projects under Part 3A of the EP&A Act. DP&I have now repealed Part 3A. Most developments that would previously have been assessed and determined under Part 3A will now fall into either:

- Part 4 – State Significant Development (SSD): these will be projects put forward by the private sector and determined by the Planning Assessment Commission.
- Part 5.1 – State Significant Infrastructure (SSI): infrastructure projects undertaken by or on behalf of public authorities and determined by the Minister for Planning and Infrastructure.

There are also transitional arrangements for existing projects that will continue to be assessed and processed as Part 3A projects. For the purposes of this policy these existing proposals will continue to be referred to as Part 3A; SSD and SSI are referred to collectively as 'State significant projects'.

A proportion of Part 3A and State significant projects also affect nationally listed threatened species and threatened ecological communities (TECs). These proposals are considered by the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The question of suitable offsetting often arises in the context of these decisions. This policy seeks to provide a consistent and transparent approach to impact assessment and offsetting for projects assessed under Part 3A or as SSD or SSI. This policy also provides the basis for aligning NSW and Commonwealth assessment and offsetting processes by providing an assessment pathway that is likely to satisfy both NSW and DSEWPC requirements provided that certain standards are met.

This policy will operate on a trial basis in partnership with DSEWPC and DP&I until 30 June 2012, and will be reviewed at the end of this period.

### 2 Scope and application

This interim policy relates to proposals that are assessed by DP&I under the Part 3A, SSD or SSI provisions of the EP&A Act, and are not being considered as part of the Biobanking Scheme.

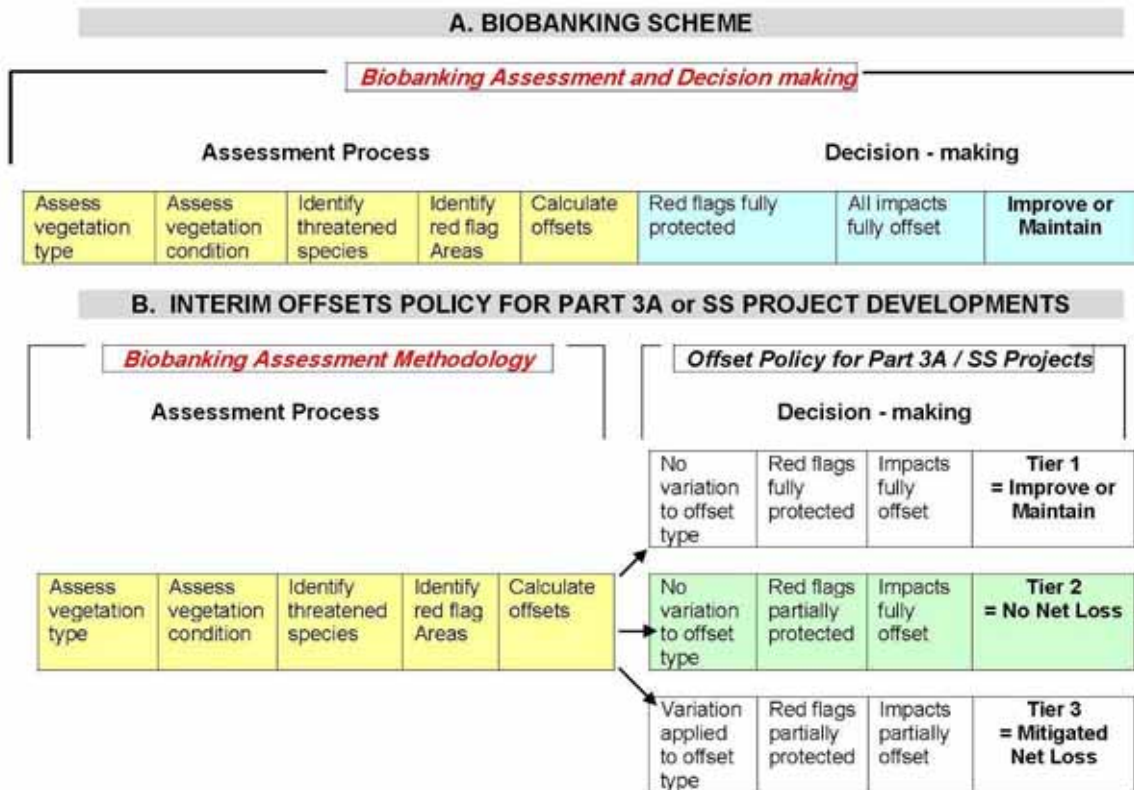
This interim policy:

- acknowledges that proposals assessed as State significant projects or Part 3A do not have to meet the "improve or maintain" standard, which is required under the Biobanking scheme;
- nevertheless, adopts the use of the Biobanking Assessment Methodology (BBAM) for the purpose of:
  - > quantifying and categorising the biodiversity values and impacts of State significant projects or Part 3A proposals;

- > establishing, for benchmarking purposes, the offsets that would be required if the State significant project or Part 3A proposal had been expected to meet the improve or maintain standard;
- provides a structured approach to determining how proposals may, in lieu of meeting the improve or maintain standard, meet one of two alternative standards established under this policy.

Diagram 1 illustrates how the BBAM is applied under this policy, in contrast to its application under the BioBanking Scheme.

**Diagram 1: Application of the Biobanking methodology to Part 3A and State significant (SS) project offsetting decisions**



This interim policy does not apply to:

- decisions on developments under Part 4 or 5 of the EP&A Act (except SSD under Part 4 or SSI under 5.1 of the EP&A Act); or
- decisions on the making of environmental planning instruments (EPIs) under Part 3 of the EP&A Act.

### 3 Definitions

BBAM:

Biobanking Credit Calculator:

Biodiversity Credits:

DGRs:

Biobanking Assessment Methodology

As defined under the BBAM

Ecosystem or species credits required to offset the loss of biodiversity values on development sites or created on biobank sites from management actions that improve biodiversity values  
 Director-General's Requirements for either an EIS (issued by DP&I) or a SIS (issued by OEH)

EARs	Environmental Assessment Requirements
Ecosystem credit:	As defined by the <i>Threatened Species Conservation Act 1995</i> (TSC Act)
EPI:	Environmental Planning Instrument as defined by the EP&A Act
ESD:	Ecologically Sustainable Development
State significant project:	Collectively State significant development and State significant infrastructure projects
Planning authority:	A person or body exercising and consent or approval role under the EP&A Act – usually a Council or DP&I;
Proponent:	A person or body seeking consent or approval under the EP&A Act.
Red flag:	As defined by the BBAM – areas of particular conservation significance of sufficient scale to be viable over the medium to long term.
Relevant planning decisions	Decisions made by DP&I under Part 3A, 4 or 5.1 of the EP&A Act
Variation criteria:	Options outlined in this policy vary the offsetting requirement in certain circumstances
Species credit:	As defined by the TSC Act
SSD:	State significant development as defined by the EP&A Act
SSI:	State significant infrastructure as defined by the EP&A Act
Threatened Species concurrence and consultation decisions:	Decisions made under section 79(B), in the case of Part 4 EP&A Act matters, and sections 112B and 112C, in the case of Part 5 matters
Voluntary planning Agreement	A planning agreement as defined by the EP&A Act

#### 4 OEH's policy on impact assessment and offsetting

Attachment A sets out the process for Part 3A proposals considered under this policy. It is expected to be similar for State significant projects (this will be confirmed after release of the new regulations outlining the State significant project process).

##### 4.1 Determining offset requirements

Under this policy, the Biobanking Assessment Methodology (BBAM) is used for the following purposes:

- to describe, quantify and categorise the biodiversity values and impacts of a proposal;
- to identify, for benchmarking purposes, the offsetting that would be required to meet the improve or maintain standard; and
- to provide the information for calculating offsets under this policy.

The BBAM is an assessment tool that allows the impacts of a proposal and its offsetting requirements to be calculated in a consistent and transparent way. The BBAM can be applied on:

- a voluntary basis by the proponent, either on a formal basis as part of the Biobanking Scheme, or as part of the assessment of a State significant project or Part 3A proposal;
- by OEH to inform its submissions to the DP&I on State significant project or Part 3A proposals. In such cases OEH would be using the assessment information provided by the proponent to assess likely impacts and calculate offset requirements.

OEH will support both of these options being implemented by:

- Amending and then recommending standard Environmental Assessment Requirements for State significant projects or Part 3A to include the option for the proponent to use the BBAM in his or her environmental assessment; and
- Internally applying the BBAM to State significant projects or Part 3A proposals using the information provided by the proponents in their Environmental Assessment; and using that

assessment and this policy as the basis for OEH submissions on State significant projects or Part 3A proposals. (See Attachment A.)

Due to resourcing constraints it will not be possible for OEH to undertake this work for all State significant projects or Part 3A proposals but all efforts should be made to use the BBAM where the State significant project or Part 3A proposal is or is likely to be an EPBC Act controlled action.

Where it is not possible due to resourcing constraints to apply the BBAM, offsets are to be negotiated on a case by case basis and in accordance with OEH's offsetting principles (See <http://www.environment.nsw.gov.au/biocertification/offsets.htm>). The *NSW OEH interim policy on assessing and offsetting biodiversity impacts of Part 3A, State significant development (SSD) and State significant infrastructure (SSI) projects* is not relevant to offsets that have been calculated without applying the BBAM.

The Policy provides for a range of mechanisms to be used to implement offsets (ie. not only biobanking credits) in view of the currently limited supply of biodiversity credits on the market.

The Policy describes 3 possible outcomes that proposals should strive to meet depending on the circumstances. These outcomes are described in Table 1.

**Table 1: Offsetting calculations using the BBAM\***

Outcome achieved	Level of impact	Offsetting requirement
- Improve or maintain (Tier 1)	- red flag assets protected and clearing only occurs within the variation rules set by the BBAM	- calculated by the credit calculator**
- No net loss (Tier 2)	- some/all red flags not protected and clearing allowed outside the variations rules permitted by the BBAM	- calculated by the credit calculator**
- Mitigated net loss (Tier 3)	- as for 'no net loss'	- calculated by the credit calculator but then amended by the offset variation criteria contained in Attachment A of this policy to a minimum land offset to clearing ratio of 2:1

\* These standards do not apply where the BBAM has not been used as it is not possible to identify red flags or credit requirements in the absence of the BBAM assessment.

\*\* The difference between Tier 1 and 2 relates only to the clearing of red flags. The amount of offsetting required is the same for both Tiers

OEH's submissions will advocate that proposals deliver at least one of these outcomes, with "improve or maintain" (Tier 1) being preferred.

#### 4.2 Determining an appropriate outcome

##### Tier 1: "Improve or Maintain"

While not required of State significant projects or former Part 3A proposals, the "Improve or Maintain" nevertheless represents a high standard of biodiversity protection. OEH should set out in its submissions to DP&I the requirements for meeting this standard. DSEWPC has advised that proposals that meet the "Improve or Maintain" standard are likely to satisfy its requirements for impact assessment and offsetting.

A proposal can fall short of the "Improve or Maintain" standard in two main ways: either red flag assets are to be cleared outside the rules allowed by the BBAM; and/or the amount and type of offsetting secured is inconsistent with the requirements of the BBAM credit calculator.

##### Tier 2: Negotiating a "No Net Loss" outcome

'No Net Loss' is attained when it is proposed to clear red flags outside the variation rules permitted by the BBAM, but all impacts are to be fully offset in accordance with the BBAM requirements.

In deciding whether this is appropriate, consideration should be given to:

- a) whether any feasible alternatives exist that would avoid clearing;
- b) the value of the resource (in the case of extractive industries) or other economic benefits and the likely contribution of the proposal to local and regional economies.

Most Part 3A proposals and State significant projects are of social and economic significance to State and regional economies. It is for DP&I to compare and balance the significance of economic or social benefits, and potential environmental (including biodiversity) impacts and gains.

DP&I has prepared draft social and economic impact assessment guidelines to assist decisions makers balance social, economic and environmental outcomes. OEH will work with DP&I on the preparation of these guidelines and their subsequent integration with future versions of this policy.

Proposals that meet the 'No Net Loss' outcome may satisfy DSEWPC requirements for impact assessment and offsetting provided that a sound economic and social justification for anticipated impacts is provided.

#### Tier 3: Negotiating a "Mitigated Net Loss" outcome

"Mitigated Net Loss" occurs when red flag assets are to be cleared and this clearing is considered acceptable under the requirements set out for no net loss; and the amount and type of offsetting proposed is inconsistent with the requirements of the BBAM credit calculator. In considering whether the mitigated net loss standard is appropriate, consideration should be given to:

- a) whether the credits required by the calculator are available on the market;
- b) whether alternative offset sites (other than credits) are available on the market;
- c) the overall cost of the offsets and whether these costs are reasonable given the circumstances.

Should any of these circumstances apply, then it is reasonable to apply the variation criteria to the point that:

- a) suitable offset sites can be found within a reasonable<sup>2</sup> timeframe;
- b) the costs of offsetting is brought within a reasonable range; and
- c) an offset to clearing ratio of at least 2:1 vegetated to cleared hectares is achieved.

The variation criteria are set out at Attachment B. In summary the variation criteria:

- Make provision for the conversion of ecosystem credits to another type of ecosystem credit;
- Make provision for conversion of one type of ecosystem credit to another type of ecosystem credit and for the waiving of species credits in some circumstances;
- Remove the need for offsets where clearing is minimal and confined to non-threatened vegetation; and
- Make provision for the conversion of ecosystem and species credits to hectares which, in turn, allows the land value of the offset to be estimated. In this way, approvals can be issued that specify either the hectares or the financial contribution that would need to be made to secure the land required for offsetting.

OEH should set out in its submissions to DP&I the requirements for meeting this standard.

Proposals that meet a mitigated net loss outcome will be considered on merit by DSEWPC.

## 5 Securing an offset site

### 5.1 Criteria for determining suitability of an offset site

OEH offset principles require offsets to be managed under effective and secure long term management arrangements. Dedication of land under the *National Parks and Wildlife Act 1974* (NPW Act), and the establishment of biobanking sites with Biobanking Agreements under the TSC Act, meet this requirement because:

- a) The unambiguous principal objective of ongoing site management is biodiversity conservation;

<sup>2</sup> What is "reasonable" is contingent upon a range of factors and needs to be considered on a case by case basis.

- b) Management is undertaken in accordance with a Plan of Management;
- c) There is reasonable likelihood that sufficient resourcing will be available to implement the Plan of Management over-time;
- d) The arrangements are in-perpetuity, and conservation obligations are transparently transferred and disclosed to any new owners of the land through appropriate administrative procedures; and
- e) There are appropriate accountability mechanisms to secure the outcomes and these mechanisms cannot be altered without alternative and comparable offsetting arrangements being put in place.
- f) An alternative to establishing biobanking sites is to retire biobanking credits, where appropriate credits are available. The Minister for Planning may approve a project under Part 3A subject to a condition that requires a proponent to acquire and retire biodiversity credits of a specified number and class (section 75JA, EP&A Act). S.89I and 115ZC allow approvals for all State significant projects to include conditions that require biodiversity credits to be obtained and retired by the proponent.

Other conservation mechanisms may also meet the criteria in certain circumstances. These include:

- a) Conservation Agreements under the NPW Act;
- b) Trust Agreements under the *Nature Conservation Trust Act 2001* (NCT Act);
- c) A Property Vegetation Plan registered on title under the *Native Vegetation Act 2003* (NV Act); and
- d) A Planning agreement under s93F of the EPA Act.

The suitability of these mechanisms (or any other mechanism) depends on whether the proposed arrangements are likely to result in the management of the land in accordance with the five criteria above.

## 5.2 Offsetting and reservation under the NPW Act

If an offset site is proposed that may involve the transfer of land to OEH for reservation under the NPW Act, then consultation must occur with the relevant PWG Branch Director at the earliest possible stage. No commitment should be made to accept an offset involving new reserves without the agreement of the Deputy Chief Executive, PWG. Similarly, no commitment should be made to accept offsets involving other forms of in-perpetuity protection without the agreement of the relevant sponsoring body.

## 6 Implementation and accountabilities

Staff may use the BBAM only if they have been trained. Some Catchment Management Authorities (CMAs) have indicated an interest in participating in offsetting discussions and may be available to assist OEH to undertake this work. OEH, however, will remain the lead Agency responsible for offsetting negotiations on behalf of the Environment portfolio. Positions with significant responsibilities under this interim policy are listed below.

Position	Responsibility
Director, LEC Manager, Conservation Policy and Strategy, LEC	Policy development and review
Manager, Biodiversity and Vegetation Programs	Issue biobanking statements and agreements State-wide co-ordination of biobanking program Overall program support including Biobanking helpline, Workshops and Training and accreditation programs.
Regional Director, EPRG	To approve the communication of BBAM outcomes to proponents and planning authorities To approve amendments to credit requirements in accordance with the requirements of this policy To liaise with PWG Branch Directors on offset proposals involve new reserves
Manager, Planning and Aboriginal Heritage,	To approve use of BBAM by OEH staff when dealing with

EPRG Manager, Metro Projects and Support (Metro only), EPRG Manager Environment and Conservation Programs (NW only), EPRG Manager, Regional Operations, EPRG	SSD, SSI or Part 3A matters
Regional Operations Officers, EPRG Catchment Management Officer, CMA	Must be trained in BBAM in order to apply to methodology

## 7 Policy review

This interim policy will be reviewed by 30 June 2012.

## 8 Contacts for further advice

For further advice on this policy please contact:

Ms Julie Ravallion, Manager, Conservation Policy and Strategy on 02 9995 6729

For advice offsetting and new reserve proposals please contact Mr Ray Fowke, Environment Planning Advisor on 02 9585 6607

For advice on the Biobanking Scheme please contact the Biobanking helpline.

## 9 Related policies and other documents

BioBanking Assessment Methodology and Credit Calculator Operational Manual, March 2009,  
<http://www.environment.nsw.gov.au/resources/biobanking/09181bioopsman.pdf>

OEH's offsetting principles can be found at:

<http://www.environment.nsw.gov.au/biocertification/offsets.htm>

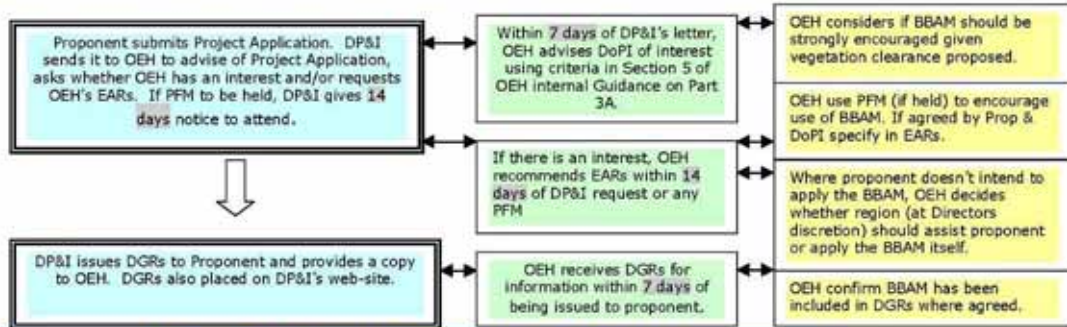
The Department of Sustainability, Environment, Water, Population and Communities' draft offsetting policy can be found at:

(<http://www.environment.gov.au/epbc/publications/draft-environmental-offsets.html>)

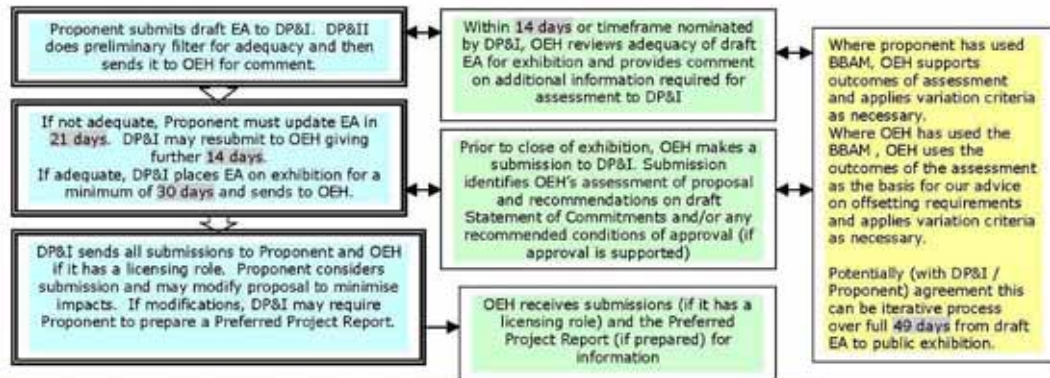
**Attachment A: Typical Project Application’s Process under Former Part 3A**

Note: The project application process for State significant projects is under development (as of July 2011)

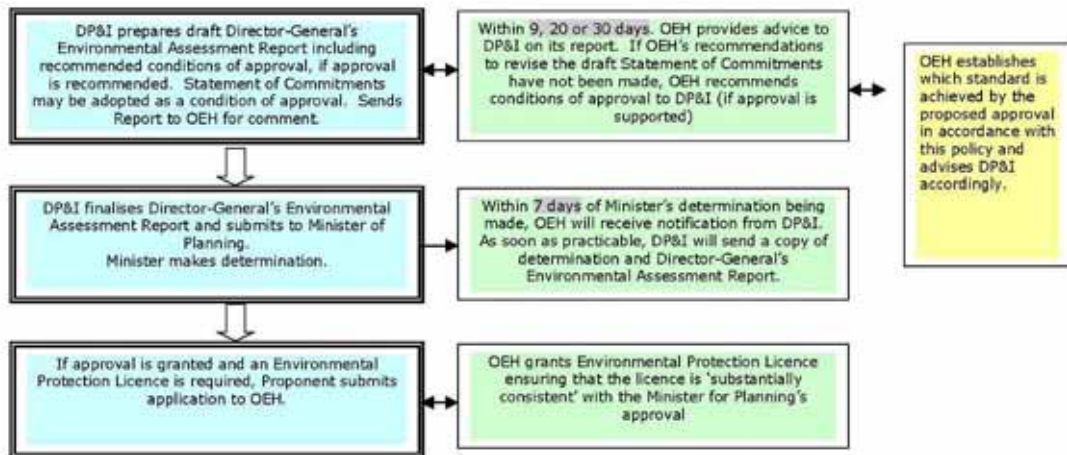
**Stage 1: Project Application and requirements of Environmental**



**Stage 2: Exhibition, Consultation and Review**



**Stage 3: Assessment and Determination**



**Notes** - All times are in calendar days.  
 DP&I Department of Planning and Infrastructure    EARs Environmental Assessment Requirements  
 DGRs Director-General's Requirements    PFM Planning Focus Meeting  
 EA Environmental Assessment  
 DP&I /Proponent Statutory Requirements    OEH Statutory Requirements    Offset Policy Requirements



Attachment B: Variation criteria for mitigated net loss (Tier 3)

To achieve Tier 3 - mitigated net loss standard, the following variation criteria may be applied to the offsetting requirements of the BBAM. The minimum area standard is an offset to clearing ratio of 2:1.

Variation criteria	When is this option appropriate	How
a) Convert ecosystem credits for one vegetation type to any vegetation type within the same vegetation formation in the same IBRA bioregion	When no matching ecosystem credits are available	Review to biometric vegetation database to identify vegetation types in the same formation in the same IBRA bioregion.  Number of credits should be the same.
b) Convert one type of species credit to another type of species credit with the same or more endangered conservation status	When species credit is not available and the matching species credit is considered a greater conservation priority.	Review conservation status of species  Number of credits should be the same
c) Remove/reduce the need for offsetting	Where clearing is minimal (less 4 ha) and where the vegetation is not a highly cleared vegetation type or a Commonwealth or State listed TEC.	Identify and remove credits required for offsetting vegetation under 4ha and for vegetation types that aren't greater than 70% cleared or a Commonwealth or State listed TEC
d) Convert ecosystem credits required to hectares and, if necessary, convert hectare figure to an estimate of land value	Where suitable offset sites are known to exist but: <ul style="list-style-type: none"> <li>there is insufficient time to secure the offset sites at the time the decision is made; or</li> <li>the proposal is to use the services of a third party provider such as the Nature Conservation Trust to secure offset sites and an estimate of cost is required.</li> </ul>	Convert credits required to hectares using the credit to ha converter <sup>1</sup> and ensure that the approval: <ul style="list-style-type: none"> <li>specifies the type, location and condition of offsets; and</li> <li>secured offset sites in accordance with the requirements of section 5 of this Policy.</li> </ul> An estimate of the cost of the offset can be made by using a Valuer Generals estimate of land value.
e) Waive the requirement for species credits  NB: This criteria should not be used for EPBC Act listed species where the proposal is a controlled action	Where no matching credits are available and all ecosystem credits have been obtained in accordance with this policy	Remove the requirement
f) Convert ecosystem credits to a regional conservation priority as identified in a regional conservation plan or similar	When no matching credits are available and variation 1 is not feasible	Identify areas of high conservation priority in existing regional conservation plans or similar. Convert credits required to hectares <sup>1</sup> . Identify eligible offset sites and ensure areas are of sufficient size, condition and landscape context.

<sup>1</sup>OEH is currently finalising an excel spreadsheet which converts credits to hectares. This spreadsheet will be lodged on the OEH intranet site.

## Appendix B: RBG letter confirming Red Stringybark specimens



Brian TOWLE  
Eco Logical  
Suite 4, 2-4 Merton St  
Sutherland, NSW 2232

Enquiry No: 17957  
Botanical.Is@rbgsyd.nsw.gov.au  
Fax No: (02) 9251 1952  
Ph No: (02) 9231 8111  
Date: 15 July 2013

**Subject: Plant identification – eucalypt specimens from Moolarben Coal Stage 1 Modifications**

Dear Brian and Liz,

Your 4 eucalypt specimens have been determined as:

*Eucalyptus macrorhyncha* - det. S.F. McCune 13<sup>th</sup> June 13

An invoice for \$88.00 (incl. GST) will be forwarded to you separately by our finance section to cover cost of identification.

Thank you for your enquiry.

Yours sincerely

Andrew Orme  
Identification Technical Officer  
Botanical Information Service



Go to our online Botanical Information Services at [plantnet.rbgsyd.nsw.gov.au](http://plantnet.rbgsyd.nsw.gov.au) to find out more about plants of New South Wales



The Botanical Information Email address is [Botanical.Is@rbgsyd.nsw.gov.au](mailto:Botanical.Is@rbgsyd.nsw.gov.au)  
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An estate of the Royal Botanic Gardens and Domain Trust, a statutory body within the Office of Environment and Heritage, Department of Premier and Cabinet.

# Appendix C: Preliminary Flora and Fauna Assessments of Proposed Offset Properties

A preliminary investigation of the biodiversity values of the proposed offset properties was undertaken for a total of six days between February and April 2013. The property inspections were carried out by ELA ecologists Brian Towle, David Allworth and Daniel Magdi. Biometric vegetation type and condition mapping was undertaken across all properties, biometric plot data was collected at the Clifford and Elward properties only and brief fauna surveys (habitat assessment, diurnal bird surveys and Anabat devices) were undertaken at the Clifford, Elward and Property #24.

## Elward and Clifford Properties

The Elward and Clifford properties were surveyed over a 5 day period from 26 February to 28 February 2013 and 7 and 8 March. The properties were extensively walked to obtain the patterns of vegetation and waypoints were taken to determine boundaries.

Targeted fauna surveys were undertaken across the two properties over a two day period, to determine the potential presence of target threatened fauna species being impacted by the proposed modification (**Figure 10**). The surveys included:

- Habitat assessment – investigation into the broad habitat types located across the two properties;
- Diurnal bird survey – four 30 minute diurnal bird surveys were conducted across each property over the two day period;
- Anabat devices – two anabat devices were placed in different habitat types over a one night period per site. Anabat analysis was undertaken by Alicia Scanlon of ELA.

The Elward property is located on Triassic Narrabeen Sandstone. The area consists of cliff lined ridge areas dominated by *Eucalyptus fibrosa* (Broad-Leaved Ironbark) with a shrubby understorey. In areas below the cliff line or 'jump up' *Eucalyptus crebra* (Narrow-leaved Ironbark) was dominant, with areas of *Eucalyptus blakelyi* (Blakely's Red Gum) with grassy understorey in drainage lines. The majority of the property is still in woodland form. Seven Biometric Vegetation types were identified across the Elward property. Although the vegetation on the properties have more affinity with vegetation communities of the Central West CMA, they are located in the east flowing Hunter catchment. Therefore the Biometric Vegetation types were matched to the Hunter Central Rivers vegetation types. At times more appropriate equivalents were available from the Central West vegetation types. One biometric plot was undertaken in each vegetation zone (vegetation type and condition state) to inform a site condition score for improve or maintain calculations:

- Dwyer's Red Gum low woodland on exposed sandstone ridges of the upper Hunter Valley, Sydney Basin;
- Narrow-leaved Ironbark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin;

- Scribbly Gum - Brown Bloodwood woodland of the southern Brigalow Belt South;
- Caley's Ironbark - Currawang shrubby woodland on sandstone ridges of the upper Hunter Valley, Sydney Basin;
- Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands (**Figure 8**);
- Grey Box - Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin;
- Tea-tree shrubland of drainage areas of the slopes and tablelands.

The Clifford property is located on a low slope area with a Carboniferous Granite outcrop in the western sector. Broad drainage lines with deeper soils have grassy woodland of Blakely's Red Gum. Along creek lines there are deeper sands with *Angophora floribunda* (Rough-Barked Apple) and *Eucalyptus rossii* (Inland Scribbly Gum) or frontage areas with duplex soils supporting *Eucalyptus moluccana* (Grey Box). Rough Barked Apple is common throughout, and Narrow-leaved Ironbark and *Eucalyptus dealbata* (Tumbledown Red Gum) area found on rises. Approximately half the property is cleared, with some areas with a strong presence of native grasses. Five Biometric Vegetation types were identified across the Clifford property:

- Dwyer's Red Gum low woodland on exposed sandstone ridges of the upper Hunter Valley, Sydney Basin;
- Narrow-leaved Ironbark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin;
- Scribbly Gum - Brown Bloodwood woodland of the southern Brigalow Belt South;
- Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands (**Figure 9**);
- Grey Box - Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin.

The fauna surveys undertaken within the Elward and Clifford property identified a range of broad habitat features providing habitat for a range of threatened fauna species. These habitat elements include:

- Intact canopy layer;
- Derived native grasslands;
- Hollow-bearing trees;
- Stags;
- Ephemeral drainage lines and associated vegetation;
- Dams with open water and emergent vegetation;
- Woody debris (fallen logs and braches);
- Rocky outcrops
- Cliff lines.

Most of the habitat elements are present within the wooded areas of the two properties, however, cliff line habitat only occurs within the Elward property.

The habitat elements available within the properties potentially provide sheltering, foraging, and roosting habitat for a range of fauna groups, particularly where canopy trees and stags support hollows for arboreal mammals, birds and bats to shelter/roost/breed. Intact canopy, shrub layers and derived grassland provide foraging habitat for birds and bats. Woody debris and rocky outcrops provide potential foraging and sheltering habitat for ground dwelling mammals, frogs and reptiles.

The brief fauna survey recorded nine threatened fauna species:

- Brown Treecreeper (Elward property);
- Diamond Firetail (Clifford property);
- Grey-crowned Babbler (Elward property);
- Speckled Warbler (Elward property);
- Eastern Bent-wing Bat (Elward and Clifford properties);
- Eastern False Pipistrelle (Clifford property)
- Large-eared Pied Bat (Clifford property)
- Southern Myotis (Elward property);
- Yellow-bellied Sheathtail Bat (Elward property).



**Figure 9: Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands within the Elward property.**



**Figure 10: Scribbly Gum - Brown Bloodwood woodland of the southern Brigalow Belt South within the Clifford property.**



Figure 11: Potential roosting/breeding habitat for cave bats (Elward property)



Figure 12: Potential roosting/breeding habitat for cave bats (Elward property)



Figure 13: Fauna survey locations within the Clifford and Elward properties



### **Moolarmoo and Bobadeen (Williams) Properties**

The Moolarmoo and Williams properties were surveyed on the 26 March 2013 for a total of 9 hours to validate vegetation types and condition. Dominant species were recorded in each visually determined different vegetation community to allow the allocation of a Biometric Vegetation Types.

The Moolarmoo property is located in a cliff lined valley, which includes steep colluvial slopes and rockfall areas at the base of the Narrabeen Sandstone cliffs. The valley floor is of Permian sediments. The valley floor and low slopes are cleared and supported a mix of Rough Barked Apple, *Eucalyptus melliodora* (Yellow Box) and Blakely's Red Gum, remnant trees remain. The steeper areas have Rough Barked Apple and *Eucalyptus punctata* (Grey Gum). On the cliff line there is Grey Gum and Stringybarks. The rocky nature of the cliff bases provide the fire protection to allow large figs (*Ficus rubiginosa*) to grow. As the valley narrows wet forest/ rainforest species such as *Pittosporum undulatum* (Sweet Pittosporum) appear. Five Biometric Vegetation Types were identified across the Moolarmoo property:

- Grey Gum - Narrow-leaved Stringybark - ironbark woodland on ridges of the upper Hunter Valley, Sydney Basin;
- Narrow-leaved Ironbark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin;
- Caley's Ironbark - Currawang shrubby woodland on sandstone ridges of the upper Hunter Valley, Sydney Basin;
- Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands;
- Giant Stinging Tree- Fig dry subtropical rainforest of the North Coast and Brigalow Belt South (**Figure 11**).

The Williams property (Old Bobadeen) is an elevated property located on Triassic Narrabeen Beds, Jurassic Purlawaugh Formation, Jurassic Pilliga Sandstones and Tertiary Basalts. Along flowlines there are Blakely's Red Gum and Yellow Box, with some Rough Barked Apple. On slopes there is the native grasslands derived from cleared Box-Gum Grassy Woodland. Rocky outcrops support Narrow-Leafed Ironbark with a shrubby understorey. Rocky outcrops occur at a range of elevations. The majority of this property is cleared. The property has extensive areas of Derived Native Grasslands of Box-Gum Woodland in moderate to good condition. Three Biometric Vegetation Types were identified across the Bobadeen property:

- Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin;
- White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW (**Figure 12**);
- Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.



Figure 14: Giant Stinging Tree- Fig dry subtropical rainforest of the North Coast and Brigalow Belt South (Moolarmoo)



Figure 15: White Box Yellow Box Grassy Woodland on basalt slopes in the upper Hunter Valley NSW (Bobadeen).



Figure 16: Potential roosting/breeding habitat for cave bats (Elward property)



Figure 17: Potential roosting/breeding habitat for cave bats (Elward property)

### **Properties #5, #24 and #25**

Property #24 and #25 were surveyed on the 16 April 2013. The vegetation mapping of these properties was undertaken by an overall drive and walk across the properties to allow interpretation of the aerial photography. For the delineation of lines the property was criss-crossed to visually intersect all boundaries.

Property #5 was surveyed on the 16 April. The vegetation mapping of this property was undertaken by walking across the site (both on top of the escarpment and on low slope cleared areas) to allow interpretation of the aerial photography. For the delineation of lines the property was criss-crossed to visually intersect all boundaries.

Property #24 and # 25 contain a granite outcrop in the in southern half, with low slope area running north and north-east to a flowline. The property has been extensively cleared in the past, but there is now widespread regeneration with numerous small trees having established. Where granite rock outcrops occur, Tumbledown Red Gum, Narrow-leaved Ironbark, *Eucalyptus macrorhyncha* (Red Stringybark) and Rough-Barked Apple predominate. With development of soils downslope and along creek lines Blakely's Red and Rough-Barked Apple are dominant. Two Biometric Vegetation Types were identified across the property #24/25:

- Rough-barked Apple - Silvertop Stringybark - Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast;
- Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.

Property #5 is bisected by a north-south running sandstone escarpment overlying granite which outcrops in the lower slope areas. The steep slopes of the escarpment and the ridge above the escarpment are fully vegetated with woodland. The lower sloping area on the eastern half of the site have been cleared and is now dominated by native grassland. The lower slope areas have Blakely's Red Gum Grass Woodland and remnant clumps of Rough-Barked Apple sparsely scattered across the native grassland. On the escarpment and ridges Tumbledown Red Gum, *Eucalyptus parramattensis* (Parramatta Red Gum), Red Stringybark, Narrow-leaved Ironbark, *Callitris endlicheri* (Black Cypress Pine) and Rough-Barked Apple are dominant. Four Biometric Vegetation Types were identified across the property #5:

- Dwyer's Red Gum low woodland on exposed sandstone ridges of the upper Hunter Valley, Sydney Basin;
- Narrow-leaved Ironbark - Grey Gum shrubby woodland on footslopes on the upper Hunter Valley, Sydney Basin;
- Rough-barked Apple - Silvertop Stringybark - Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast;
- Blakely's Red Gum - Yellow Box grassy open forest or woodland of the New England Tablelands.

Previous fauna monitoring in spring 2010 (ELA 2011) was undertaken within Property #24 (**Figure 13**). The monitoring included a suite of methods:

- Active searches for amphibians during the day and night for a period of 0.5 hrs;
- Diurnal bird survey for a period 1 hr;
- Nocturnal bird call playback over a night period for a period of 0.75 hrs;

- Mammal trapping including 10 A Elliott's, three B Elliott's, three bandicoot cage traps, one large cage trap, five small hair tubes and five large hair tubes;
- Spotlighting was undertaken for mammals, reptiles and amphibians for 0.5 hrs over one night;
- One Anabat device for a period of one night;
- Active searches for reptiles during the day and night for a period of 0.5 hrs.

The fauna monitoring undertaken within Property #24 during spring 2010 (ELA 2011) identified two threatened fauna species, including:

- Speckled Warbler;
- Eastern Bent-wing Bat.

One threatened fauna species was opportunistically identified within Property #5, the Glossy Black Cockatoo was observed flying across the proposed offset area. Fauna monitoring has also been undertaken in the Stage 1 Offset Area located adjacent to Property #5. This fauna monitoring has been undertaken since 2011 and a number of threatened fauna species have been identified. Similar habitat characteristics are found within Property #5 and therefore it is likely that similar threatened species will reside for foraging or roosting purposes within the remnant vegetation of Property #5. The threatened species identified include:

- Brown Treecreeper;
- Glossy Black Cockatoo;
- Powerful Owl;
- Speckled Warbler;
- Varied Sittella;
- Eastern Bent-wing Bat;
- Eastern Cave Bat;
- Eastern False Pipistrelle;
- Large-eared Pied Bat;
- Little Pied Bat;
- Southern Myotis;
- Yellow-bellied Sheathtail Bat.



Figure 18: 2010 spring survey methods within Property #24.



**Figure 19: Rough-barked Apple - Silvertop Stringybark - Red Stringybark grassy open forest on hills of the upper Hunter Valley, southern North Coast (Property #24).**



**Figure 20: Dwyer's Red Gum low woodland on exposed sandstone ridges of the upper Hunter Valley, Sydney Basin (Property #5).**

## Appendix D: Summary of BBAM predicted ecosystem fauna assemblages in impact and offset property vegetation types

Scientific name	Predicted by BBAM in impact area vegetation types							Recorded on offset properties	Predicted by BBAM in offset property vegetation types											
	Common name	Recorded on Site	HU653	HU604	HU552	HU605	HU654		HU552	HU605	HU654	HU527	HU537	HU548	HU551	HU574	HU575	HU603	HU608	HU647
<i>Burhinus grallarius</i>	Bush Stone-curlew	No	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes	
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	Likely																		
<i>Cercartetus nanus</i>	Eastern Pygmy Possum	No	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			Yes	
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Likely						Yes												
<i>Circus assimilis</i>	Spotted Harrier	No																		
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Possible	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	
<i>Daphoenositta chrysoptera</i>	Varied Siteella	Likely						Yes												
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	No	Yes				Yes	Yes		Yes		Yes		Yes	Yes			Yes		
<i>Glossopsitta pusilla</i>	Little Lorikeet	Likely	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Grantiella picta</i>	Painted Honeyeater	Likely	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Hieraaetus morphnoides</i>	Little Eagle	No																		
<i>Hoplocephalus stephensii</i>	Stephen's Banded Snake	No											Yes							
<i>Lathamus discolor</i>	Swift Parrot	Possible	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Leipoa ocellata</i>	Malleefowl	No									Yes	Yes							Yes	
<i>Lophoictinia isura</i>	Square-tailed Kite	Likely																		
<i>Melanodryas cucullata</i>	Hooded Robin	Likely																		
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater	Likely	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat (foraging)	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		
<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	No				Yes				Yes			Yes	Yes						
<i>Myotis adversus</i>	Southern Myotis	No						Yes												
<i>Neophema pulchella</i>	Turquoise Parrot	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Ninox connivens</i>	Barking Owl	Possible	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	
<i>Ninox strenua</i>	Powerful Owl	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Nyctophilus timoriensis</i>	Greater Long-eared Bat (south eastern form)	Likely	Yes									Yes			Yes				Yes	
<i>Petaurus australis</i>	Yellow-bellied Glider	No	Yes			Yes				Yes						Yes				
<i>Petaurus norfolkensis</i>	Squirrel Glider	Possible	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes			Yes	Yes		Yes		
<i>Petroica boodang</i>	Scarlet Robin	Yes		Yes	Yes		Yes		Yes		Yes	Yes		Yes	Yes		Yes	Yes	Yes	
<i>Phascogale cinereus</i>	Koala	Possible	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes		
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	No	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes		



Scientific name	Predicted by BBAM in impact area vegetation types							Recorded on offset properties	Predicted by BBAM in offset property vegetation types											
	Common name	Recorded on Site	HU653	HU604	HU552	HU605	HU654		HU552	HU605	HU654	HU527	HU537	HU548	HU551	HU574	HU575	HU603	HU608	HU647
<i>Pyrrholaemus sagittatus</i>	Speckled Warbler	Yes	Yes		Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes		Yes	Yes		Yes	
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	Likely	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Possible	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Stagonopleura guttata</i>	Diamond Firetail	Yes		Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes		Yes	Yes		Yes		Yes
<i>Tyto novaehollandiae</i>	Masked Owl	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes	
<i>Vespadelus troughtoni</i>	Eastern Cave Bat (foraging)	Yes	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	
<i>Xanthomyza phrygia</i>	Regent Honeyeater	Likely	Yes		Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes		Yes	

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## Appendix F

### Stage 1 water management infrastructure upgrades – technical assessments

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# Memorandum



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29 August 2013

To | John Arnold  
From | Tim Brooker

Subject | Surface water management infrastructure upgrades – traffic assessment

---

## 1 Introduction

This memorandum provides consideration of the potential for additional traffic impacts from the surface water management infrastructure upgrades described in the Moolarben Coal Project (MCP) Stage 1 Optimisation Modification (MOD9) response to submissions (RtS) report and shown in Figure 2 (RtS report, Appendix D).

Construction works associated with the surface water management infrastructure upgrades will be undertaken over a period of approximately six months, planned to commence in February 2014.

Vehicular movements required for construction, comprise approximately:

- eight light vehicle movements daily (four in each direction) for construction work crews travelling to and from worksites each day; and
- between three and seven truck deliveries per day of construction materials to the site including topsoil, hydromulch, rock for erosion protection and geotextile fabrics and meshes.

There will also be approximately nine vehicle movements in total by low loaders or equivalent vehicles for deliveries of plant and equipment to the site at the commencement of the works and their removal at the completion of the works. These vehicle movements are occasional and, as such, will not have any daily traffic impact on an ongoing basis.

Imported materials will be sourced locally from the Mudgee area and trucks supplying these will travel to site via the Ulan Road route from Mudgee.

Truck traffic movements during construction will generally be contained within the main infrastructure area. Movements to its south will be minimal and do not, therefore, require detailed consideration.

This assessment has conservatively assumed that all construction traffic is additional to levels assessed and approved under the current Stage 1 approval (MP 05\_0117).

## 2 Assessment method

Typical daily light vehicle and truck traffic movements which will be travelling to and from the main MCP site access (to the north of the rail line) during this period via external roads (for example, Ulan Road) have been compared to the current daily traffic usage of these roads to determine whether there will be any noticeable or significant traffic impact on these roads as a result of the construction traffic.

The intersection traffic safety of the main site access route has also been reviewed.

No vehicle movements beyond those assessed and approved under MP 05\_0117 will be required from the operation of the surface water management infrastructure upgrades.

### 3 Existing environment

The existing road network in the locality of the MCP and average weekly daily traffic volumes are shown on Figure 5 (RtS Report, Appendix D). The existing average weekday daily traffic volumes using this road network are also shown in this figure. These daily traffic volumes were determined during a program of tube traffic counts which were undertaken by the Mid Western Regional Council on Ulan Road and all its major connecting roads in March 2011.

The surveyed daily traffic volumes for the main site access and the sections of the Ulan Road at Ulan and south of Ulan, heading towards Mudgee, are summarised in Table 3.1. The proportions of heavy vehicles in traffic and the corresponding heavy vehicle daily traffic movements at each location are also summarised.

**Table 1 Existing daily traffic volumes and heavy vehicle movements**

Road location	Existing daily traffic volume (weekdays)	Percentage of heavy vehicles	Daily heavy vehicle traffic movements
MCP main site entrance	524	14%	73
Ulan Road, north of Ulan Underground Mine Entrance	955	18%	172
Ulan Road, north of Cope Road intersection at Ulan	2631	10%	263
Ulan Road, south of Cope Road intersection at Ulan	1963	10%	196
Ulan Road, north of Wollar Road intersection at Budgee Budgee	2491	7%	174
Ulan Road, south of Wollar Road intersection at Budgee Budgee	3157	7%	221

In the vicinity of the main MCP site access at Ulan, Ulan Road is typically a sealed two lane road with sealed shoulders and a 100 km/hr speed limit. There are a number of major intersections on Ulan Road at the following locations:

- Ulan underground mine entrance, Moolarben underground mine entrance;
- the Ulan-Wollar Road;
- Ulan open cut mine entrance; and
- Cope Road.

At each of these intersections, the visibility (sight distance) for turning traffic is generally good and adequate for 100 km/hr travel speeds and additional left and right turning deceleration lanes are provided which optimise the traffic safety at each intersection.

The existing traffic safety of these intersections on Ulan Road, including the main MCP site access intersection (which is the most recently constructed intersection on Ulan Road) is considered to be generally good.

### 4 Impact assessment

The estimated additional daily construction traffic movements per day, over the six month construction period, will be approximately eight light vehicle movements and 10 heavy vehicle movements (ie, between three and seven truck deliveries each day will give an average of five truck deliveries per day on average).

The existing daily traffic and heavy vehicle traffic volumes on the affected roads are approximately:

- 520 vehicles per day (vpd) including approximately 70 heavy vehicle movements on the main MCP site access road and the intersection with Ulan Road; and

- 2500 vpd including approximately 200 heavy vehicle movements on the various sections of Ulan Road in the Ulan area and between Ulan and Mudgee.

The construction traffic volumes on these roads (approximately 18 vehicle movements daily) will generate approximately 3.5% and 0.7% temporary daily traffic increases, respectively.

In terms of heavy vehicle traffic, the project generated construction traffic volumes on these roads (approximately 10 truck movements daily) will generate approximately 14% and 5% temporary daily traffic increase, respectively.

These project generated construction traffic increases will not be significant in terms of the existing overall daily traffic movements on these roads or at the intersection of the main MCP site access road with Ulan Road. The predicted 5% increase in the daily truck traffic movements which are using Ulan Road to/from the south towards Mudgee are unlikely to be noticeable to other road users and will not generally affect the traffic flow or the road pavement condition of the route over the likely six month period during which it will occur.

At the existing intersection of the main MCP site access road with Ulan Road, the intersection has a good level of traffic capacity and traffic safety with good visibility for turning traffic and both left and right turning deceleration lanes for turning traffic. This intersection does not require further detailed traffic capacity assessment for the relatively minimal (approximately 3.5%) daily traffic increases on main MCP site access road which will be generated during the construction period.

## 5 Environmental management

No specific traffic control measures are required above those specified in MP 05\_0117.

## 6 Conclusion

Construction associated with the surface water management infrastructure upgrades has been assessed for the affected roads, namely the main MCP site access road and the Ulan Road route towards Mudgee. The predicted construction traffic increases on these roads will be minimal on an average daily traffic basis and will not affect the existing traffic capacity or traffic safety of either of these roads or the intersection of the mine access road with Ulan Road.





# Memorandum



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28 August 2013

To | John Arnold  
From | Ryan Desic

Subject | Surface water management infrastructure upgrades – Aboriginal cultural heritage assessment

## 1 Introduction

A detailed Aboriginal cultural heritage study was prepared for the Moolarben Coal Project (MCP) Stage 1 Optimisation Modification (MOD9) by South East Archaeology and is attached as Appendix F to the MOD9 environmental assessment (EA). This memorandum forms an addendum to the study and provides consideration of the potential for additional Aboriginal cultural heritage impacts from the surface water management infrastructure upgrades described in the MOD9 response to submissions (RtS) report and shown in Figure 2 (RtS report, Appendix D).

## 2 Aboriginal cultural heritage assessment requirements

An assessment of the additional disturbance area required for the surface water management infrastructure upgrades has been carried out according to the procedures and protocols described in the approved Stage 1 Aboriginal Heritage Management Plan (ACHMP). The ACHMP was recently revised in consultation with the NSW Office of Environment and Heritage (OEH) and Aboriginal community stakeholders and approved by the Director General of the Department of Planning and Infrastructure (DP&I) on 4 June 2013. (Note the recently revised and approved ACHMP now covers the entire MCP Stage 1 project area, as modified, replacing the previous ACHMP which covered the Mine Infrastructure Area (MIA) and Open Cut 1 disturbance areas only).

The revised and approved ACHMP sets out procedures for the management of all interactions of the MCP Stage 1 project with Aboriginal cultural heritage, in accordance with relevant project approvals. Specifically sections 4.4, 4.5 and 4.6 of the ACHMP set out the assessment and management procedures required for previously unidentified Aboriginal heritage evidence, and for areas not sampled during previous assessments.

While certain areas of the proposed upgrades are within previously surveyed areas, Moolarben Coal Operations Pt Limited (MCO) adopted a conservative approach and had all proposed disturbance areas inspected by an archaeologist (Ryan Desic) and representatives from each registered Aboriginal stakeholder group.

## 3 Aboriginal consultation

Section 4 of the ACHMP provides a full history of MCO's Aboriginal consultation as well as its ongoing consultation commitments and requirements.

Aboriginal representatives from Mudgee Local Aboriginal Land Council (Mudgee LALC), Warrabinga Native Title Claimants Aboriginal Corporation (WNTCAC), Murong Gialinga Aboriginal and Torres Strait Islanders Corporation (MGATSIC) and North-East Wiradjuri Company Ltd (NEWCO) participated in an archaeological survey with Archaeologist Ryan Desic on 16 August 2013. This was coordinated by MCO's Cultural Heritage Officer, Lyn

Syme. Draft copies of this report were provided to the registered Aboriginal stakeholder groups on 28 August 2013 for their review and comment.

## 4 Prior Aboriginal archaeological assessment

Previous Aboriginal cultural heritage investigations have been repeatedly summarised and synthesised as part of ongoing heritage works for the entire Moolarben Coal Complex (MCC) (Stage 1 and Stage 2). The most up to date amalgamation of previous archaeological investigations is provided in Section 3 of the approved Stage 1 ACHMP. Further, Appendix 2 of the ACHMP lists all identified Aboriginal heritage sites located within the MCC area, with their Aboriginal Heritage Information Management System (AHIMS) numbers, proposed management strategies and current management status. In addition, MCO maintains an Aboriginal Site Database for the MCC. This data was reviewed in preparation for the field survey.

A search of the AHIMS register was also conducted by Ryan Desic on 19 August 2013 for the proposed disturbance areas (within MGA coordinates 7610000E–765000E 6426000N–6427500N). The AHIMS search was undertaken to identify any Aboriginal sites not previously identified in the MCC Aboriginal Site Database. A total of 63 previously registered Aboriginal sites were identified in proximity to the proposed works.

The majority of previously recorded sites have been subject to archaeological salvage works to enable development of the Stage 1 MIA. Notwithstanding, following a review of previous assessment reports and the MCO Aboriginal sites database it was unclear whether all proposed disturbance areas required for the surface water management infrastructure upgrades had previously been surveyed. Hence, a conservative approach was adopted with these areas being subject to additional archaeological investigation including survey.

## 5 Field survey methods

### 5.1 Survey overview

One representative from each of the four Registered Aboriginal stakeholder groups participated in the archaeology field survey, which included targeted survey by foot of the proposed disturbance footprint. Areas that were known to have previously been salvaged — such as Sediment Dam 10B — were not surveyed. The surveyed areas are shown on Figure 2 (RtS report, Appendix D).

The survey inspected all areas of ground within survey transects. No sandstone was noted within the survey transects. All stone artefacts were inspected by Ryan Desic, who has expertise in their identification, and verified as artefacts. Verified artefacts were recorded (including GPS coordinate), photographed and a detailed description documented.

### 5.2 Survey coverage data

The survey effort was divided into four transect survey units. Survey units were divided specific to individual development footprints or obvious changes in vegetation (for example, Transect 2 was recorded as a separate transect as it was undertaken in an area of regrowth vegetation as opposed to the cleared terrain in the rest of the survey area). Landform divisions for sampling were not required as the majority of the survey was undertaken on a creek flat with only 3,500 m<sup>2</sup> of lower slope covered.

Ground exposure and visibility varied across the study area. The majority of the study area had been cleared of vegetation with native and exotic grass covering the ground. Native shrubs and trees were sparse with the exception of Transect 2. Exposures typically comprised of areas previously disturbed by infrastructure, erosion scars, animal tracks and bioturbation — especially from wild pig foraging.

Table 4.1 presents the results of the survey assessment and coverage.

**Table 5.1 Effective survey coverage results**

Landform unit	Survey units	Area (m <sup>2</sup> )	Exposure %	Visibility %	Effective coverage area (m <sup>2</sup> )	Effective coverage %	Results
Flat	Transect 1	54,160	40	70	15,164	27	-
Flat	Transect 2	49,306	20	40	3,944	16	-
Flat	Transect 3	78,100	50	70	27,335	35	2 isolated stone artefact sites
Flat, Simple lower slope	Transect 4	32,400	30	60	5,832	18	-

## 6 Results and discussion

Two Aboriginal sites, not previously identified, were recorded as a result of the archaeological survey. Both of the sites were isolated stone artefacts found within a heavily disturbed context. The location of the sites are shown in Figure 2 (Rts report, Appendix D) and described in Table 5.1.

**Table 6.1 Previously unrecorded Aboriginal sites within the study area**

Site name	Site features	Comments
S1MC 356 (Transect 3)	<p>Isolated find located on an exposure that is an access road easement. Road easement is approximately 5 m in width and is aligned on an east west axis.</p> <p>The site is within 10 m of the original Bora Creek alignment.</p> <p>The site is within a heavily disturbed context and may have been exposed from imported material or heavily mixed soil resulting from the construction of the railway, road, or the constructed creek alignment.</p>	<p>A single isolated flake of Indurated Mudstone/Tuff (IMT) material. Artefact is grey/white in colour with a hinge termination. Flake has been used as a core to remove a single flake from its ventral surface.</p> <p>Platform present.</p> <p>L:35 mm W:14 mm T:6.8 mm</p> <p>Weight: 2.85 g</p> <p>No cortex.</p> <p>MGA coordinates: 55 H 763124E 6426882N</p>
S1MC 357 (Transect 3)	<p>Isolated find located at the base of the rail loop embankment. Embankment is approximately 5 m in width and is aligned on an east west axis. The site is approximately 100 m north of Bora Creek.</p> <p>The site is within a heavily disturbed context because of its location within imported or mixed soils from the construction of the railway embankment.</p>	<p>A single isolated flake of quartz material. Artefact is milky white in colour and is a flaked piece.</p> <p>20% cortex.</p> <p>No platform present.</p> <p>L: 17 mm W: 11 mm T: 9 mm</p> <p>Weight 1.9 g</p> <p>MGA coordinates: 55 H 0762882 6426983</p>

All potential archaeological deposits (PADs) previously identified in these areas have been subject to test excavation and salvage where appropriate. Extensive subsurface testing and salvage has occurred within and adjacent to Sediment Dam 12, CHPP, Cockies Dam and Diversion Bund 1. This assessment did not identify any further PADs. The two isolated artefact sites identified in this assessment were located in highly disturbed contexts and are considered of low significance, as identified in the assessment of significance provided in Attachment A.

Although the landscape close to Bora Creek can be considered archaeologically sensitive, the Aboriginal cultural heritage work completed to date has tested and salvaged all Aboriginal sites that would have previously been at risk from impact as a result of the surface water management infrastructure upgrades.

Notwithstanding, Site S1MC 305 which occurs adjacent to the western limit of the proposed Diversion Bund 1 is part of the Bora Creek North Conservation Area and impacts on this site should be avoided. Any ground disturbance works within the boundary of S1MC 305 has the potential to partially disturb the site.

To meet the requirements of the Stage 1 ACHMP and to ensure potential impacts on Aboriginal objects are minimised, it is recommended that MCO:

- Ensure the final detailed design of Diversion Bund 1 remains outside the boundary of Site S1MC 305 so as to avoid impacts to any existing surface or subsurface artefact deposits.
- Update the Aboriginal site database and AHIMS register to include sites S1MC 356 and 357.
- If any previously unrecorded Aboriginal objects are identified during construction works, then such evidence will be managed in accordance with Section 4.5 of the Stage 1 ACHMP.

Impacts are permitted without further action (ie collection is not required) for sites S1MC 356 and 357. These sites are of low significance and have been subject to detailed recording in accordance with Section 4.5.1 of the approved Stage 1 ACHMP.

## A.1 Assessments of significance

This section provides a significance assessment of the Aboriginal sites that were recorded during the archaeological survey for this assessment. Previously recorded Aboriginal sites have not been considered.

### A.1.1 Defining heritage significance

Heritage sites, objects and places hold value for communities in many different ways. The nature of those heritage values is an important consideration when deciding how to manage a heritage site, object or place and balance competing land-use options.

The many heritage values are summed up in an assessment of 'cultural significance'.

The primary guide to management of heritage places is the Australia ICOMOS Burra Charter 1999. The Burra Charter defines cultural significance as follows:

*"Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups."*

The significance of Aboriginal sites is considered in the context of the significance criteria presented below.

### A.1.2 Socio-cultural value: significance to the Aboriginal community

To date, no information has been received that identifies specific heritage value unrelated to the Aboriginal sites identified in this assessment. MCO has consulted directly with all Aboriginal community stakeholders affected by the surface water management infrastructure upgrades; as such, the relevant groups will be providing their own statement of Aboriginal significance to accompany this assessment.

## A.2 Scientific value

### A.2.1 Research potential

The archaeological survey and assessment did not reveal any features which are of research potential. The artefacts identified are typical of the area, being debitage from stone knapping activities and were identified within heavily disturbed contexts with their relationship to the surrounding landscape lost.

### A.2.2 Rarity

The archaeological survey and assessment did not yield any rare or uncommon features.

### A.2.3 Integrity

The Aboriginal sites identified during survey were in heavily disturbed contexts as a result of mine-related activities. It was impossible to ascertain whether the artefacts were simply exposed from a nearby disturbance activity or imported from another location in land fill.

### A.2.4 Research themes

The sites identified during survey offer no contribution to the understanding of chronology or stone technology.

### A.3 Educational value

There are no sites or Aboriginal objects considered to have any educational potential.

### A.4 Scientific significance rating

Based on the above significance criteria, Table 6.1 below summarises the significance rating for each site.

**Table B.1 Level of scientific significance assessed for Aboriginal sites/objects located within and nearby the study area**

Site name	MGA (GDA) easting	MGA (GDA) northing	# of artefacts	Scientific significance
S1MC 356 (Transect 3)	763124	6426882	1	Low
S1MC 357 (Transect 3)	762882	6426983	1	Low

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30 August 2013

To | John Arnold  
From | Katie Whiting

Subject | Surface water management infrastructure upgrades – ecological assessment

## 1 Introduction

A detailed ecological study was prepared for the Moolarben Coal Project (MCP) Stage 1 Optimisation Modification (MOD9) by EMGA Mitchell McLennan (EMM) and is attached as Appendix E to the MOD9 environmental assessment (EA). This memorandum forms an addendum to the study and provides consideration of the potential for additional ecological impacts from the surface water management infrastructure upgrades described in the MOD9 response to submissions (RtS) report and shown on Figure 2 (RtS report, Appendix D).

The study area for this assessment has allowed for an approximate 20 m disturbance footprint around (and including) each of the surface water management infrastructure upgrades. This has been provided to allow flexibility in the movement of construction vehicles during the proposed works. Therefore, the actual area of disturbance is likely to be less than the areas shown on Figure 3 (RtS report, Appendix D) and referenced in this memorandum.

It is noted that the proposed disturbance area is entirely within the Stage 1 project approval boundary, is adjacent to existing infrastructure and is required for the implementation of pollution control works.

## 2 Assessment method

A desktop review of vegetation mapping, previous reports and scientific databases (NSW Wildlife Atlas and Commonwealth Protected Matters Search Tool) was completed prior to the site inspection to determine potential ecological constraints to the proposed works. The site inspection included:

- verification of existing vegetation mapping and identification of threatened ecological communities;
- five vegetation plots in line with the BioBanking Assessment Method (DECC 2008);
- targeted searches for threatened flora species and populations with a moderate to high likelihood of occurrence;
- ultrasonic detection for threatened microbats;
- targeted surveys for threatened birds;
- identification of fauna habitats including tree hollows, caves, waterways, dams, fallen timber, nests and foraging resources; and
- signs that indicate the presence of threatened fauna species.

## 3 Existing environment

### 3.1 Vegetation types and threatened ecological communities

Four native and one disturbed vegetation type were recorded in the study area (refer to Figure 1 and Table 1).

Vegetation type	Structure	Dominant species	Biometric Vegetation Type	Threatened ecological community	Condition class as per BBAM
Blakely's Red Gum Woodland	Open woodland to 15 m height	Blakely's Red Gum ( <i>Eucalyptus blakelyi</i> ), Rough-barked Apple ( <i>Angophora floribunda</i> ), Wattle Mat Rush ( <i>Lomandra filiformis</i> subsp. <i>coriacea</i> )	HU515 Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands	Box Gum Woodland	Good
Grey Box/ Narrow-leaved Ironbark/ Blakely's Red Gum Woodland		Blakely's Red Gum, Narrow-leaved Ironbark ( <i>E. crebra</i> ), Three-awn grass ( <i>Aristida ramosa</i> ), Wiry Panic ( <i>Entolasia stricta</i> )	HU551 Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin	Box Gum Woodland	Good
Rough-barked Apple Open Forest	Open woodland to 18 m height	Rough-barked Apple, Three-awn grass, Wiry Panic, Kangaroo Grass ( <i>Themeda australis</i> )	HU605 Rough-barked Apple grassy open forest on valley flats of the North Coast and Sydney Basin	N/A	Good
Sifton Bush Shrubland	Open shrubland to 1.5 m height	Sifton Bush ( <i>Cassinia arcuata</i> ), Mudgee Wattle ( <i>Acacia spectabilis</i> ), Three-awn grass, Wiry Panic	HU551 Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin	N/A	Moderate to good
Disturbed	N/A	Water Couch ( <i>Paspalum disticum</i> ), Catsear ( <i>Hypochaeris radicata</i> *), Whiskey Grass ( <i>Andropogon virginicus</i> *), Mouse-eared Chickweed ( <i>Cerastium vulgatum</i> *)	Cleared land	N/A	Cleared land

Notes: 1.BBAM – BioBanking Assessment Methodology (DECC 2008a), \*denotes introduced species

Blakely's Red Gum Woodland and Grey Box/Narrow-leaved Ironbark/Blakely's Red Gum Woodland meet the description of White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community listed under the *Threatened Species Conservation Act 1995* (TSC Act) and White Box Yellow Box Blakely's Red Gum grassy woodlands and derived native grasslands, a critically endangered ecological community listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). For ease of reading, these are collectively termed Box Gum Woodland threatened ecological community (TEC). These areas are in a regenerating state. The majority of trees are approximately 10-15 cm diameter, while large trees have been previously cut and exist as timber piles.

None of the Sifton Bush Shrubland or disturbed areas met the description of derived native grasslands under the TSC or EPBC Act definitions of this TEC.

### 3.2 Threatened species

Three threatened birds and two threatened microbat species were recorded during the field survey. One of the threatened birds, the Speckled Warbler, was recorded adjacent to the study area. The study area also provides



potential foraging habitat for 16 threatened birds and one threatened microbat species (Table 3). No migratory bird species were recorded or considered likely to occur in the study area.

<b>Table 3 Threatened species recorded or with the potential to occur in the study area</b>				
Species	Conservation status		Habitat use	Relevant vegetation types
	TSC Act	EPBC Act		
<b>Species recorded in the study area</b>				
Eastern Bentwing Bat ( <i>Miniopterus schreibersii oceanensis</i> )	V	-	Foraging	1, 2, 3
Eastern Cave Bat ( <i>Vespadelus troughtoni</i> )	V	-	Foraging	1, 2, 3
Grey-crowned Babbler ( <i>Pomatostomus temporalis temporalis</i> )	V	-	Foraging, potential nesting	1, 2, 3
Scarlet Robin ( <i>Petroica boodang</i> )	V	-	Foraging, potential nesting	1, 2, 3
<b>Species recorded adjacent to the study area</b>				
Speckled Warbler ( <i>Chthonicola sagittata</i> )	V	-	Foraging, potential nesting	1, 2, 3
<b>Species not recorded, but with moderate to high potential to occur in the study area</b>				
Pine Donkey Orchid ( <i>Diuris tricolor</i> )	V	-	Habitat	1, 2
Black-breasted Buzzard ( <i>Hamirostra melanosternon</i> )	V	-	Foraging only	1, 2, 3, 5
Brown Treecreeper (eastern subspecies) ( <i>Climacteris picumnus victoriae</i> )	V	-	Foraging only	1, 2, 3
Diamond Firetail ( <i>Stagnopleura guttata</i> )	V	-	Foraging and nesting	4
East Coast Freetail Bat ( <i>Mormopterus norfolkensis</i> )	V	-	Foraging only	1, 2, 3
Flame Robin ( <i>Petroica phoenicea</i> )	V	-	Foraging only	1, 2, 3
Hooded Robin ( <i>Melanodryas cucullata cucullata</i> )	V	-	Foraging only	1, 2, 3
Large-eared Pied Bat ( <i>Chalinolobus dwyeri</i> )	V	V	Foraging only	1, 2, 3
Little Lorikeet ( <i>Glossopsitta pusilla</i> )	V	-	Foraging only	1, 2, 3
Painted Honeyeater ( <i>Grantiella picta</i> )			Foraging only	1, 2
Regent Honeyeater ( <i>Anthochaera phrygia</i> )	CE	E	Foraging only	1, 2
Square-tailed Kite ( <i>Lophoictinia isura</i> )	V	-	Foraging only	1, 2, 3, 5
Southern Long-eared Bat ( <i>Nyctophilus corbeni</i> )	V	V	Foraging only	1, 2
Spotted Harrier ( <i>Circus assimilis</i> )	V	-	Foraging only	4, 5
Turquoise Parrot ( <i>Neophema pulchella</i> )	V	-	Foraging only	1, 2, 3
Varied Sittella ( <i>Daphoenositta chrysoptera</i> )	V	-	Foraging only	1, 2, 3

Notes: Vegetation types: 1. Blakely's Red Gum Woodland, 2. Grey Box/Narrow-leaved Ironbark/Blakely's Red Gum Woodland, 3. Rough-barked Apple Woodland, 4. Sifton Bush Shrubland

Conservation status: V-vulnerable, E-endangered, CE-critically endangered

## 4 Impact assessment

### 4.1 Vegetation clearing

Conservatively, up to about 22.7 ha of vegetation will be disturbed as a result of implementing the surface water infrastructure upgrades (Table 4) comprising about 10.2 ha of native vegetation, and 12.5 ha of cleared land. This includes up to 3.4 ha of vegetation that meets the description of Box Gum Woodland TEC.

**Table 4**      **Vegetation clearing for the surface water management infrastructure upgrades**

<b>Vegetation type</b>	<b>TEC</b>	<b>Total disturbance within buffer area (ha)</b>
Grey Box/Narrow-leaved Ironbark/Blakely's Red Gum Woodland	Box Gum Woodland	1.34
Blakely's Red Gum Woodland	Box Gum Woodland	2.05
Rough-barked Apple Open Forest	N/A	2.28
Sifton Bush Shrubland	N/A	4.56
Cleared land	N/A	12.50
<b>Total</b>		<b>22.73</b>

Assessments of significance (provided in Attachment A) were completed for the Box Gum Woodland TEC in line with the TSC Act and EPBC Act impact criteria. The proposed works will remove up to 3.4 ha of this community. This loss is unlikely to constitute a significant impact given the small area cleared, the retention of connectivity and the net benefit provided in the long term by reconnecting fragmented woodland patches in line with MCO's Landscape Management Plan (LMP). Further, the Biodiversity Offset Strategy and Proposed Package (refer to Appendix E of the main report), includes substantial areas of Box Gum Woodland that will be conserved for biodiversity outcomes at a ratio of about 1 to 15.66 for the areas being cleared.

## 4.2 Threatened species

The proposed works will result in small losses of habitat for a number of threatened species. Assessments of significance (Attachment A) undertaken under TSC Act and EPBC Act impact criteria concluded that impacts resulting from the proposed works on threatened species recorded in the study area were not significant for the following reasons:

- cave-roosting bats - the study area contains foraging habitat only, which is an abundant resource in the locality. No large sandstone escarpments are present, therefore breeding and shelter habitat is absent; and
- woodland birds - no nests were observed in the study area during the breeding season and, therefore, the study area only represents foraging habitat that is an abundant resource in the locality.

The study area provides potential foraging habitat for a number of threatened species not recorded during the survey. Impacts on these species are not significant for the following reasons:

- Pine Donkey Orchid – the locality does not contain an important population of the species. Only two individuals were found in the wider MCP mining complex during detailed surveys;
- raptors, woodland birds and tree-roosting microbats - the study area provides potential foraging habitat only, no potential breeding habitat is present (with the exception of the Diamond Firetail); and
- Diamond Firetail – potential breeding and foraging habitat is present; however this habitat is abundant in the locality and is therefore not critical to their survival.

## 4.3 Other potential impacts

No other potential impacts are likely to significantly impact on the ecological values of the study area and surrounds as:

- although feral animals are present, control measures under MCO's LMP will reduce the associated key threatening processes;
- no impacts to habitat connectivity will occur, with MCO's LMP reconnecting fragmented patches and improving connectivity;

- indirect impacts from erosion, sedimentation and weed invasion will be controlled; and
- indirect impacts from noise will be temporary and controlled.

No additional management and monitoring measures beyond those listed in Section 10.4 of the EA are required as a result of the surface water infrastructure upgrades.

## 5 Conclusions

The study area contains four native vegetation types and disturbed vegetation which is classified as cleared land under the BBAM. Two native vegetation types recorded meet the description of Box Gum Woodland TEC. Using a conservative estimate with an approximate 20 m disturbance buffer, about 3.4 ha of this community will be removed or disturbed for the proposed works. This community is in a regenerating state following prior clearing of large trees which now exist as timber piles. Significant impacts are not predicted for this TEC given the minor nature of clearing, with large areas of the community retained and conserved on land proximal to the site, measures to improve connectivity in line with the LMP and the substantial areas of this community proposed to be conserved under the Biodiversity Offset Strategy and Proposed Package that provides an offset ratio of 1 to 15.66.

The area of proposed disturbance also contains known and potential habitat for a number of threatened bird and microbat species. Impacts are not predicted to be significant for these species given the minor nature of clearing and the absence of shelter and breeding habitat for many species. For those species where potential breeding habitat exists, such habitat is a widely abundant resource in the locality and is therefore not critical to the survival of local populations.

## 6 References

Department of Environment and Climate Change (DECC) 2008, *BioBanking Assessment Methodology*, Department of Environment and Climate Change NSW, Sydney

## A.1 Assessments of significance in accordance with the TSC Act

Assessments of significance are provided for TSC Act listed species and communities that have been recorded, or have potential habitat in the study area. The assessment criteria are provided in Appendix E of the MOD9 EA.

### i Threatened Ecological Communities: White Box Yellow Box Blakely's Red Gum Woodland

**Table A.1 Assessment of impact for White Box Yellow Box Blakely's Red Gum Woodland TEC**

Criteria	Discussion
<b>1: life cycle of threatened species</b>	This question refers to threatened species, therefore is not relevant to the assessment.
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to the assessment.
<b>3: EEC extent of removal and modification</b>	<p>This TEC has been heavily cleared in the Hunter-Central Rivers CMA (90 % cleared since 1750 (DECC 2008b)). The proposed works will result in the removal of up to 3.39 ha of the TEC. In the study area, it occurs on the disturbed edge of a larger patch of the same community. It is regenerating following previous clearing.</p> <p>Although this community is heavily cleared in the CMA area, the removal of this small area of regenerating woodland on the edge of a larger patch is unlikely to have an adverse effect on the extent of the community. Additionally, the proponent has committed to rehabilitate this community and conserve substantial nearby areas outside the study area in the long term at a ratio of 1 to 15.68 for the areas being disturbed under MOD9.</p> <p>Potential indirect impacts of the proposed works that could modify this community include the introduction or spread of weeds to adjacent areas. To minimise these potential impacts rehabilitation, weed control and monitoring will be implemented in accordance with MCO's Landscape Management Plan (LMP).</p>
<b>4: habitat removal, fragmentation, isolation and importance</b>	<p>The proposed works will remove up to 3.39 ha of the TEC. The proposed works will not fragment the community in the locality as it is located in the centre of two large, continuous patches of vegetation.</p> <p>Given the level of past clearing in the Hunter Central Rivers CMA area, all areas of this community are considered important. However, the proposed works will only remove a relatively small area of this community that is regenerating and immediately adjacent to existing mine infrastructure. As noted above, the proponent has committed to rehabilitate this community and conserve substantial nearby areas outside the study area in the long term at a ratio of 1 to 15.66 for the areas being disturbed under MOD9.</p>
<b>5: critical habitat</b>	Habitat critical to the survival of the TEC has been identified by DECCW (2010) as wherever it occurs. The proposed works will result in the removal of up to 3.39 ha of such habitat. However, the proponent has committed to rehabilitate this community and conserve nearby areas outside the study area in the long-term.
<b>6: consistency with recovery or threat abatement plans</b>	Recovery objectives for the TEC focus on the achievement of 'no net loss', increasing connectivity and restoring sites (DECCW 2010).The proposed works will remove a small area of this TEC, therefore it is not consistent with the recovery plan. MCO's LMP aims to reduce the impact of clearing by rehabilitating disturbed areas with species characteristic of this community. In addition, the proposed BOS will provide for the long term conservation of large areas of this community in

**Table A.1 Assessment of impact for White Box Yellow Box Blakely’s Red Gum Woodland TEC**

Criteria	Discussion
	the locality, providing a net long term benefit.
<b>7: key threatening processes</b>	<p>The proposed work constitutes the key threatening process (KTP) ‘clearing of native vegetation’. A revegetation strategy is outlined in MCO’s LMP to minimise the impacts of this KTP within the locality. Vegetation clearance and disturbance in and surrounding TEC areas will be minimised where possible during detailed design and mitigation in accordance with MCO’s LMP.</p> <p>Potential infection of native plants by <i>Phytophthora cinnamomi</i> is also a KTP of relevance. However, MCO’s LMP will include hygiene protocols to reduce the risk of infection of plants by <i>P. cinnamomi</i>, and therefore impacts are considered a low risk.</p>
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts on White Box Yellow Box Blakely’s Red Gum Woodland because:</p> <ul style="list-style-type: none"> <li>• a small area (up to 3.39 ha) of the TEC will be removed on the edge of existing patches of the TEC;</li> <li>• fragmentation will not occur; and</li> <li>• a net benefit will be delivered in the locality through the reconnection of fragmented woodland patches in line with MCO’s LMP and implementation of the BOS.</li> </ul>

ii Threatened flora: Pine Donkey Orchid

**Table A.2 Assessment of impact criteria for Pine Donkey Orchid**

Criteria	Discussion
<b>1: life cycle of threatened species</b>	<p>The proposed works will not result in the removal of any known individuals from the study area. However, potential habitat exists within the Box Gum Woodland TEC of the study area. The life cycle of flora species can be affected in the following main ways:</p> <ul style="list-style-type: none"> <li>• impacts to pollination (internal mechanisms or impacts to pollinators) – the Pine Donkey Orchid is probably pollinated by native bees. The proposed works have the potential to remove a small area of native bee pollinator habitat from the study area, which could reduce the number of pollinators in the area, leading to a potential reduction in pollination of the orchid;</li> <li>• ability of the plant to produce flowers – the proposed works are not expected to affect the ability of individual plants to produce flowers, this is more likely to be affected by other environmental factors such as rainfall;</li> <li>• ability of the plant to produce and set seed – the proposed works could impact the habitat of pollinators, which could impact on the number of individuals being pollinated, leading to a reduction in seed setting;</li> <li>• ability to germinate – the germination requirements of this species are not known; and</li> <li>• ability of seedlings to grow – the proposed works could produce levels of dust which could affect photosynthesis capabilities during the construction period (short-term), but being a narrow-leaved orchid it is not known the degree to which the species would rely on this for growth, compared to reliance on mycorrhizal fungi.</li> </ul>
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.

**Table A.2 Assessment of impact criteria for Pine Donkey Orchid**

<b>Criteria</b>	<b>Discussion</b>
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	<p>Potential habitat for the Pine Donkey Orchid within the study area occurs as Box Gum Woodland TEC, which will be removed for the proposed works. Modification of remaining potential habitat adjacent to the study area could occur through indirect impacts such as edge effects, including weed invasion, though it is unlikely given the controls planned.</p> <p>As the species has not been confirmed in the study area due to surveys being undertaken before the flowering period, the extent of habitat removal or isolation of habitat is unknown. The wider locality is not considered to be an important area for the species, as they were only found in low numbers (two individuals) during detailed surveys for MCP Stage 1. Surveys will be undertaken in the study area prior to clearing to identify any individuals, with appropriate management actions taken to minimise potential impacts to the species. Habitat for this species will be protected in biodiversity offset areas if found.</p> <p>The proposed works will not fragment habitat in the locality as it is located in the centre of two large, continuous patches of vegetation.</p>
<b>5: critical habitat</b>	Critical habitat has not been declared for this species.
<b>6: consistency with recovery or threat abatement plans</b>	The proposed works are not consistent with the recovery of the species as up to 3.39 ha of potential habitat will be removed. Impacts will be mitigated by commitments in MCO’s LMP to rehabilitate disturbed areas for biodiversity outcomes and protecting populations in biodiversity offset sites.
<b>7: key threatening processes</b>	The proposed work constitutes the KTP ‘clearing of native vegetation’. However, rehabilitation will continue in line with MCO’s LMP and areas of suitable habitat outside the MOD9 footprint will be protected under a BOS/BOP. The proposed works could also increase the impact of habitat degradation by feral pigs. However, ongoing controls will mitigate the impacts of feral animals.
<b>Conclusion</b>	<p>The proposed works are unlikely to result in significant impacts to the Pine Donkey Orchid because:</p> <ul style="list-style-type: none"> <li>• the species has not been recorded from the study area, therefore only represents potential habitat for the species;</li> <li>• the wider locality is not considered to be an important area for the species, with low numbers previously recorded;</li> <li>• surveys to detect the species in the study area will be undertaken prior to clearing, with appropriate management actions taken if detected; and</li> <li>• rehabilitation of disturbed areas will occur in line with MCO’s LMP.</li> </ul>

iii **Raptors: Black-breasted Buzzard, Spotted Harrier and Square-tailed Kite**

**Table A.3 Assessment of impact criteria for raptors (Black-breasted Buzzard, Spotted Harrier and Square-tailed Kite)**

<b>Criteria</b>	<b>Discussion</b>
<b>1: life cycle of</b>	Potential hunting habitat for threatened raptors will be impacted by the proposed works. It is

**Table A.3 Assessment of impact criteria for raptors (Black-breasted Buzzard, Spotted Harrier and Square-tailed Kite)**

<b>Criteria</b>	<b>Discussion</b>
<b>threatened species</b>	likely that these species only use the study area on an occasional basis, given the abundance of similar and higher quality hunting habitat in the surrounding area. Given that no threatened raptors or their nests were recorded within the study area, and that similar habitats for these species are available across the locality and the region, the proposed works are unlikely to affect the life cycles of viable local populations of these species such that they would be placed at risk of extinction.
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	The proposed works will remove 18.17 ha of potential habitat for the Black-breasted Buzzard and Square-tailed Kite, and 17.06 ha of potential habitat for the Spotted Harrier. Such habitat is abundant in the locality and therefore not critical to the survival of each species. Additionally, these species are highly mobile and capable of moving through disturbed environments to more suitable areas.
<b>5: critical habitat</b>	Critical habitat has not been declared for any of these threatened raptors.
<b>6: consistency with recovery or threat abatement plans</b>	The threatened raptors assessed here do not have recovery plans, threat abatement plans or priority action statements. Recovery actions identified for the species generally focus on the protection of nesting habitat along watercourses and in woodland (OEH 2013). Rehabilitation will continue in line with MCO's LMP and habitat will be protected under the BOS/BOP to conserve habitat for the species in the locality.
<b>7: key threatening processes</b>	The proposed works constitutes the KTP 'clearing of native vegetation'. A revegetation strategy is outlined in MCO's LMP to minimise this KTP.
<b>Conclusion</b>	The proposed works are not expected to result in significant impacts to threatened raptors as: <ul style="list-style-type: none"> <li>• the species are highly mobile and capable of moving through disturbed environments; and</li> <li>• similar and higher quality habitats are abundant in the surrounding area.</li> </ul>

**Table A.4 Assessment of impact criteria for threatened honeyeaters**

Criteria	Discussion
<b>1: life cycle of threatened species</b>	<p>The study area is part of an important area for the Regent Honeyeater (NPWS 2002, Birdlife International 2012). Blakely's Red Gum, an important feed tree for the Regent Honeyeater (Menkhorst, Schedvin and Geering 1999) is present in woodlands of the locality. It is therefore likely that the study area may represent potential foraging habitat for the Regent Honeyeater. Evidence of foraging or breeding has not been recorded in the study area by detailed ecological surveys of the area (Moolarben Biota 2006, Ecovision Consulting 2008, EMM 2013), but has been recorded at Munghorn Gap Nature Reserve, south of the study area.</p> <p>Potential foraging and breeding habitat is present for the Painted Honeyeaters in Blakely's Red Gum Woodland in the study area that contains mistletoe (<i>Amyema miquellii</i>).</p>
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	<p>A small area (up to 3.39 ha) of woodland, which constitutes potential habitat for the Painted and Regent Honeyeaters will be removed for the proposed works. The proposed works are unlikely to fragment habitat, as it is located in the centre of two large tracts of bushland.</p> <p>Given the decline of woodland bird species in recent years, woodland habitat in the study area is considered important to honeyeaters, particularly the Regent Honeyeater. However, the removal of this small area of potential habitat on the edge of a large tract of suitable habitat is unlikely to cause either species to decline.</p>
<b>5: critical habitat</b>	Critical habitat has not been declared for any of these bird species.
<b>6: consistency with recovery or threat abatement plans</b>	Various recovery strategies to maintain and improve priority habitats are contained in the recovery plans for the Regent Honeyeater (Menkhorst <i>et al.</i> 1999). Although the Painted Honeyeater does not have a recovery plan, proposed recovery actions are similar to the Regent Honeyeater. The proposed works are not consistent with the recovery strategies as potential breeding habitat for the species will be removed. Impacts will be mitigated by commitments in MCO's LMP to rehabilitate disturbed areas for biodiversity outcomes, including woodlands that contain Blakely's Red Gum.
<b>7: key threatening processes</b>	The proposed works are likely to constitute and increase the operation 'clearing of native vegetation'. Rehabilitation will continue in line with MCO's LMP and habitat will be protected under the BOS/BOP to conserve habitat for the species in the locality.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts on threatened Honeyeaters as:</p> <ul style="list-style-type: none"> <li>• only a small area (up to 3.39 ha) of potential habitat will be removed;</li> <li>• the species was not detected in the study area during detailed ecological surveys in the locality (Moolarben Biota 2006, Ecovision Consulting 2008, EMM 2013);</li> <li>• disturbed areas will be rehabilitated to woodland that contains Blakely's Red Gum, an important feed species; and</li> <li>• these species are highly mobile and could utilise the large expanse of native bushland</li> </ul>



**Table A.4 Assessment of impact criteria for threatened honeyeaters**

Criteria	Discussion
	that the study area is connected to for breeding and foraging habitat.
v	Threatened hollow-dependent woodland birds: Brown Treecreeper, Little Lorikeet, and Turquoise Parrot

**Table A.5 Assessment of impact criteria for hollow-dependent woodland birds (Brown Treecreeper, Little Lorikeet and Turquoise Parrot)**

Criteria	Discussion
<b>1: life cycle of threatened species</b>	As hollows are very scarce in the study area, it provides limited breeding habitat for the three species. Therefore, their breeding cycles are unlikely to be affected by the proposed works.
<b>2 : life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	<p>A small area (5.67 ha) of potential foraging habitat for the three species will be removed for the proposed works. Habitat in the study area is not critical to these species as breeding habitat is limited.</p> <p>The proposed works will not fragment habitat for hollow-dependent woodland birds as it is on the centre of two large, continuous vegetated areas. Additionally, other areas of habitat that are available in surrounding conservation areas (Goulburn River NP and Munghorn Gap Nature Reserve) provide suitable habitat for these species.</p>
<b>5: critical habitat</b>	Critical habitat has not been declared for these species.
<b>6: consistency with recovery or threat abatement plans</b>	Various recovery strategies to maintain and improve priority habitats are contained in the recovery plans for these species. Rehabilitation will continue in line with MCO's LMP and habitat will be protected under the BOS/BOP to conserve habitat for the species in the locality.
<b>7: key threatening processes</b>	The proposed works are likely to constitute and increase the operation of 'clearing of native vegetation'. MCO's LMP details measures to minimise this KTP.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts to hollow-dependent woodland birds as:</p> <ul style="list-style-type: none"> <li>• breeding is unlikely to occur in the study area given the paucity of hollows; and</li> <li>• fragmentation will not occur as the study area is located in the centre of two large, continuous vegetated areas.</li> </ul>

**Table A.6 Assessment of impact criteria for threatened nest-building woodland birds (Diamond Firetail, Grey-crowned Babbler, Speckled Warbler and Varied Sittella)**

<b>Criteria</b>	<b>Discussion</b>
<b>1: life cycle of threatened species</b>	The study area contains 5.67 ha of potential breeding habitat for threatened nest-building birds, although no evidence of breeding (ie nests or nest building) was observed. The removal of this small area of potential habitat is not expected to adversely affect the lifecycle of the species given that the area to be removed is adjacent to a large patch of continuous and similar habitat where breeding activities could occur.
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	The proposed works will not fragment habitat for nest-building birds as they are adjacent to a large area of similar habitat which is connected to a large vegetated corridor to the north of the study area. Given the decline of woodland bird species in recent years, habitat in the study area is important to these species. However, large expanses of suitable habitat are available surrounding the study area, therefore impacts from its loss will be minor. Further, MCO is committed to the rehabilitation of disturbed areas in accordance with MCO’s LMP and BOS/BOP.
<b>5: critical habitat</b>	Critical habitat has not been declared for any of these woodland birds.
<b>6: consistency with recovery or threat abatement plans</b>	Various recovery strategies to maintain and improve priority habitats are contained in the recovery plans for these species. In general, the clearing of known and potential habitat is inconsistent with the recovery of these species. However, measures to rehabilitate habitat will continue to be implemented in accordance with MCO’s LMP and BOS/BOP leading to long-term benefits in the locality.
<b>7: key threatening processes</b>	The proposed works are likely to constitute and increase the operation of ‘clearing of native vegetation’ and ‘removal of dead wood and dead trees’. Rehabilitation will continue in line with MCO’s LMP and habitat will be protected under the BOS/BOP to conserve habitat for the species in the locality.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts to threatened nest-building birds as:</p> <ul style="list-style-type: none"> <li>• only a small area of known and potential habitat will be removed on the edge of a larger patch of native vegetation;</li> <li>• connectivity will be maintained, allowing these species to access alternative habitats; and</li> <li>• measures to improve and rehabilitate habitat will continue to be implemented in accordance with MCO’s LMP and BOS/BOP.</li> </ul>

**Table A.7 Assessment of impact criteria for threatened robins (Flame Robin, Hooded Robin and Scarlet Robin)**

<b>Criteria</b>	<b>Discussion</b>
<b>1: life cycle of threatened species</b>	Given the presence of a male and female Scarlet Robin in the study area during the breeding season, they may be utilising the area for foraging during the breeding season. No Scarlet Robin nests were observed in the study area. Additionally, no Hooded Robins or their nests were observed in the study area. The removal of 5.67 ha of potential breeding habitat for these two species may cause them to move out of the study area, however it is connected to a large tract of similar vegetation where alternative, and suitable breeding habitat is available. Therefore, the removal of this small area is unlikely to adversely affect the life cycle of the species in the long term. The Flame Robin would not utilise the study area for habitat as it breeds in upland tall moist forests and woodlands on ridges and slopes.
<b>2 : life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to the assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to the assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	<p>The proposed works will remove approximately 5.67 ha of known habitat for the Scarlet Robin and the same 5.67 ha of potential habitat for the Hooded and Flame Robins. The proposed works will not fragment habitat for these species as connectivity will be maintained with surrounding areas of native bushland and conservation reserves.</p> <p>Given the decline of woodland bird species in recent years, habitat in the study area is important to the robins. However, the importance of this habitat in the study area is reduced by the wide availability of surrounding and connected suitable habitat. Habitat in the study area is not critical to the survival of threatened robins as they are unlikely to breed in the area, and alternative suitable foraging habitat is abundant in the surrounding area. Additionally, measures to rehabilitate habitat will continue to be implemented in accordance with MCO's LMP.</p>
<b>5: critical habitat</b>	Critical habitat has not been declared for any of these robin species.
<b>6: consistency with recovery or threat abatement plans</b>	Various recovery strategies to maintain and improve priority habitats are contained in the recovery plans for these species. In general, the clearing of habitat is inconsistent with the recovery of these species. However, the BOS will be implemented to achieve positive biodiversity and habitat outcomes.
<b>7: key threatening processes</b>	The proposed works are likely to constitute and increase the operation of KTPs that woodland birds are subject to including 'clearing of native vegetation'. The LMP will detail measures to minimise this KTP.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts to threatened robins as:</p> <ul style="list-style-type: none"> <li>• the Flame Robin does not breed in the area;</li> <li>• the removal of a small patch of habitat connected to a large patch of habitat is unlikely to impact breeding success for the Scarlet and Hooded Robins; and</li> <li>• connectivity will be maintained to large expanses of bushland and reserves.</li> </ul>

**Table A.8 Assessment of impact criteria for the threatened cave-roosting bats (Eastern Bentwing Bat, Eastern Cave Bat and Large-eared Pied Bat)**

<b>Criteria</b>	<b>Discussion</b>
<b>1: life cycle of threatened species</b>	Breeding and shelter habitat is absent from the study area for all three species, therefore it is not expected to adversely impact on their life cycles.
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	<p>The proposed works will remove up to 5.67 ha of foraging habitat for the Eastern Cave Bat and Eastern Bentwing Bat, and potential foraging habitat for the Large-eared Pied Bat. Habitat in the study area is not critical to the survival of the species as it is only used for foraging purposes. Additionally, it is connected to a large expanse of similar habitat where alternative foraging habitat is available.</p> <p>Habitat fragmentation is unlikely for these highly mobile species. Additionally, connectivity will be maintained as the proposed works are located in the centre of two large, continuous expanses of native vegetation.</p>
<b>5: critical habitat</b>	Critical habitat has not been declared for any of these threatened bat species.
<b>6: consistency with recovery or threat abatement plans</b>	<p>The main objective for the Large-eared Pied Bat in the Action Plan for Australian Bats is to protect known roost sites (Environment Australia 1999). The proposed works will not remove known or potential roost sites, therefore is consistent with the strategy.</p> <p>Priority actions (OEH 2013) for the threatened cave-roosting bats focus on research, monitoring, awareness and conservation. Key habitat features for the species will not be disturbed, therefore the proposed works are not inconsistent with this strategy. Additionally, rehabilitation will be undertaken in accordance with MCO's LMP and the BOS will be implemented to achieve positive outcomes for these species foraging habitats in the long-term.</p>
<b>7: key threatening processes</b>	The proposed works are likely to constitute and increase the operation of 'clearing of native vegetation'. Rehabilitation will be undertaken in accordance with MCO's LMP and the BOS will be implemented to minimise the impact of this key threatening process.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts to threatened cave-roosting bats as:</p> <ul style="list-style-type: none"> <li>• the study area does not contain any shelter or breeding habitat for these species;</li> <li>• the removal of foraging habitat on the edge of a large expanse of native vegetation is unlikely to adversely impact the species as alternative and suitable foraging habitat is available.</li> </ul>

**Table A.9 Assessment of impact criteria for the threatened tree-roosting bats (East-coast Freetail Bat and Southern Long-eared Bat)**

<b>Criteria</b>	<b>Discussion</b>
<b>1: life cycle of threatened species</b>	The study area is unlikely to provide breeding or shelter habitat for threatened tree-roosting bats given the limited number of trees with hollows. Therefore, the lifecycle of both species is unlikely to be affected by the proposed works.
<b>2: life cycle of endangered population</b>	This question refers to endangered populations, therefore is not relevant to this assessment.
<b>3: EEC extent and modification</b>	This question refers to TECs, therefore is not relevant to this assessment.
<b>4: habitat removal, fragmentation, isolation and importance</b>	A small area (5.67 ha) of potential foraging habitat will be removed for the proposed works. This is unlikely to adversely affect these species given their highly mobile nature. Additionally, the proposed works are unlikely to fragment habitat for these species, as a small area will be removed from a large expanse of native vegetation where suitable and alternative foraging habitat is available.
<b>5: critical habitat</b>	Critical habitat has not been declared for any of these threatened microbats.
<b>6: consistency with recovery or threat abatement plans</b>	Recovery objectives for the Southern Long-eared Bat (Schulz and Lumsden 2010) focus on clarification of the species range. The proposed works do not interfere with this objective.  Priority actions for the East-coast Freetail Bat focus on research, awareness and identification of key foraging and roosting habitats for the species (OEH 2013). The proposed works do not interfere with these actions.
<b>7: key threatening processes</b>	The proposed works are likely to constitute and increase the operation of 'clearing of native vegetation'. Rehabilitation will be undertaken in accordance with MCO's LMP and the BOS will be implemented to minimise the impact of this key threatening process.
<b>Conclusion</b>	The proposed works are not expected to result in significant impacts to the local populations of threatened tree-roosting bats because: <ul style="list-style-type: none"> <li>• breeding and shelter habitat is absent from the study area; and</li> <li>• fragmentation will not occur habitat as the proposed works area is a small patch of vegetation in the centre of a large expanse of bushland.</li> </ul>

## A.2 Assessments of significance in accordance with the EPBC Act

Assessments of significance are provided for EPBC Act listed species and communities that have been recorded, or have a moderate to high potential for occurrence in the study area. The assessment criteria are provided in Appendix E of the EA.

- i Critically endangered and endangered ecological community: White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grasslands

**Table A.10 Assessment of impact criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC**

Criteria	Discussion
<b>1: reduce extent of EEC</b>	<p>This TEC has been heavily cleared in the Hunter-Central Rivers CMA (90 % cleared since 1750 (DECC 2008b)). The proposed works will result in the removal of up to 3.39 ha of the TEC. In the study area, it occurs on the disturbed edge of a larger patch of the same community. It is regenerating following previous clearing.</p> <p>Although this community is heavily cleared in the CMA area, the removal of this small area of woodland on the edge of a larger patch is unlikely to have an adverse effect on the extent of the community. Additionally, the proponent has committed to rehabilitate this community and conserve substantial nearby areas outside the areas in the long term at a ratio of 1 to 15.66 for the areas being disturbed under MOD9.</p>
<b>2: fragment an EEC</b>	<p>The proposed works will not fragment the community in the locality as it is located in the centre of two large, continuous patches of vegetation. Although fragmentation will not occur as a result of the proposed works, rehabilitation will be undertaken in line with MCO's LMP and BOS/BOP to reconnect fragmented woodland areas, delivering a long-term net benefit in the locality.</p>
<b>3: adversely affect critical habitat for an EEC</b>	<p>Habitat critical to the survival of the TEC has been identified by DECCW (2010) as wherever it occurs. The proposed works will result in the removal of up to 3.39 ha of such habitat. However, the proponent has committed to rehabilitate this community and conserve nearby areas outside the proposed works area in the long-term.</p>
<b>4: modify or destroy abiotic factors</b>	<p>The proposed works are not expected to affect abiotic factors that the community relies on.</p>
<b>5: substantial change in composition of an EEC</b>	<p>Potential indirect impacts of the proposed works that could modify this community include the introduction or spread of weeds to adjacent areas. To minimise these potential impacts rehabilitation, weed control and monitoring will be implemented as part of the proposed works, in accordance with MCO's LMP.</p>
<b>6: substantial reduction in quality or integrity of EEC</b>	<p>Erosion, sedimentation and feral animals have the potential to indirectly impact the EEC without management. Measures to manage these risks will continue to be implemented in line with MCO's LMP.</p>
<b>7: interfere with recovery</b>	<p>Recovery objectives for the TEC focus on the achievement of 'no net loss', increasing connectivity and restoring sites (DECCW 2010).The proposed works will remove a small area of this TEC, therefore it is not consistent with the recovery plan. MCO's LMP aims to reduce the impact of clearing by rehabilitating disturbed areas with species characteristic of this community. In addition, the proposed BOS will provide for the long term conservation of large areas of this community in the locality, providing a net long term benefit.</p>

**Table A.10 Assessment of impact criteria for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland CEEC**

Criteria	Discussion
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts to White Box Yellow Box Blakely's Red Gum Woodland because:</p> <ul style="list-style-type: none"> <li>• a small area (up to 3.39 ha) of the TEC will be removed on the edge of a large patch of the TEC;</li> <li>• fragmentation will not occur; and</li> <li>• a net benefit will be delivered to the TEC in the locality through the reconnection of fragmented woodland patches in line with MCO's LMP and implementation of the BOS.</li> </ul>

ii **Endangered woodland birds: Regent Honeyeater**

**Table A.11 Assessment of impact criteria for the Regent Honeyeater**

Criteria	Discussion
<b>1: long-term decrease in population size</b>	<p>The study area is part of an important area for the Regent Honeyeater (NPWS 2002, Birdlife International 2012). Blakely's Red Gum, an important feed tree for the Regent Honeyeater (Menkhorst, Schedvin and Geering 1999) is present in woodlands of the locality. It is therefore likely that the study area may represent potential foraging habitat for the Regent Honeyeater. Evidence of foraging or breeding has not been recorded in the study area by detailed ecological surveys of the area (Moolarben Biota 2006, Ecovision Consulting 2008, EMM 2013), but has been recorded at Munghorn Gap Nature Reserve, south of the study area.</p>
<b>2: reduce area of occupancy</b>	<p>Regent Honeyeaters show very high site fidelity, returning to sites that have previously been used on a cyclic basis. However, as site use depends on the availability of foraging resources, the species are unlikely to be recorded at the same site every year (SEWPaC 2013). This species has not been recorded in the locality despite several targeted surveys. Therefore the proposed works are unlikely to substantially reduce the area of occupancy of these species.</p>
<b>3: fragment a population</b>	<p>The removal of an area of potential foraging habitat will not fragment populations of these highly mobile species.</p>
<b>4: adversely affect critical habitat</b>	<p>Box-Ironbark Woodland is critical wintering habitat for these species. In NSW, 70% of this habitat has been cleared. The study area contains Grey Box/Narrow-leaved Ironbark/Blakely's Red Gum Woodland, therefore, up to 1.34 ha of potential wintering habitat will be cleared for the proposed works. However, the clearing of this small area of potential wintering habitat is not to be significant given the location of the study area on the edge of a larger patch of similar vegetation.</p>
<b>5: disrupt the breeding cycle of a population</b>	<p>The Mudgee-Wollar area has been identified as an important area for the Regent Honeyeater, and contains potential breeding habitat for the species, due to the presence of Blakely's Red Gum. However, the clearing of this small potential habitat area on the edge of a larger patch of similar vegetation is unlikely to disrupt their breeding cycle.</p>
<b>6: decrease availability or quality of habitat</b>	<p>A small area (up to 1.34 ha) of potential winter foraging habitat for these species will be removed for the proposed works. Measures to rehabilitate habitats will continue to be implemented in accordance with MCO's LMP and BOS/BOP.</p>

**Table A.11 Assessment of impact criteria for the Regent Honeyeater**

Criteria	Discussion
<b>7: result in invasive species</b>	The proposed works are not expected to result in invasive species that would impact the Regent Honeyeater.
<b>8: introduce disease</b>	These species are not known to be subject to disease.
<b>9: interfere with recovery</b>	Recovery actions for the Regent Honeyeater (Menkhorst <i>et al</i> 1999) centre upon the maintenance and enhancement of habitat at key sites. MCO's LMP will minimise impacts on habitat for these species and rehabilitation efforts will replace potential habitat.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts on the Regent Honeyeater as:</p> <ul style="list-style-type: none"> <li>• a small area (up to 3.39 ha) of foraging habitat will be removed;</li> <li>• the species was not detected in the study area during detailed ecological surveys;</li> <li>• disturbed areas will be rehabilitated to woodland that contains Blakely's Red Gum, an important feed species.</li> </ul>

iii Vulnerable bats: Large-eared Pied Bat and Southern Long-eared Bat

**Table A.12 Assessment of impact criteria for vulnerable bats (Large-eared Pied Bat and Southern Long-eared Bat)**

Criteria	Discussion
<b>1: long-term decrease of an important population</b>	<p>An important population of the Large-eared Pied Bat has been identified in the sandstone escarpments of the Hunter Valley (SEWPaC 2013). Numerous records exist from Goulburn River NP (directly north of the site), which appears to be a stronghold for the species that will not be affected by the proposed works. The study area does not contain any areas of sandstone escarpments that would support breeding habitat for the species. Therefore, the proposed works will not result in a long-term decrease of an important population.</p> <p>Important populations have not been identified for the Southern Long-eared Bat, however this species has a low detection rate (1.4%) in the south west slopes, in which the study area is located, indicating that it is not an important population.</p>
<b>2: reduce area of occupancy of an important population</b>	No important populations of the Large-eared Pied Bat or Southern Long-eared Bat have been identified in the study area.
<b>3: fragment an important population</b>	The proposed works are unlikely to form a barrier to movement for these two highly mobile species as it is located in the centre of two large, continuous tracts of native vegetation.
<b>4: adversely affect critical habitat</b>	As these species were not recorded in the study area, and suitable breeding habitat is not present for the Large-eared Pied Bat, it does not contain critical habitat.
<b>5: disrupt the breeding cycle of an important population</b>	Sandstone escarpments are absent from the study area, therefore it does not contain breeding habitat for the Large-eared Pied Bat. The study area only contains one potentially suitable hollow-bearing tree for the Southern Long-eared Bat, therefore it is unlikely to be an important breeding area. It is likely that this species would preferentially use higher quality habitat (mixed age stand of open forest/woodland with a shrubby understorey) which are present to the north of the study



**Table A.12 Assessment of impact criteria for vulnerable bats (Large-eared Pied Bat and Southern Long-eared Bat)**

<b>Criteria</b>	<b>Discussion</b>
	area.
<b>6: decrease availability or quality of habitat</b>	The proposed works will remove up to 5.67 ha of potential foraging habitat for the Large-eared Pied Bat and up to 3.39 ha of potential foraging habitat for the Southern Long-eared Bat. As this habitat is connected to two large tracts of native vegetation, the availability or quality of habitat will not be decreased in the locality.
<b>7: result in invasive species</b>	Measures will continue to be implemented in accordance with MCO's LMP to limit the introduction and spread of invasive species in the study area.
<b>8: introduce disease</b>	Bat species are prone to Australian Bat Lyssavirus. However, this virus has not been isolated from either of these species.
<b>9: interfere with recovery</b>	Recovery actions for the Southern Long-eared Bat focus on gaining a better understanding of the species ecology. The proposed works does not directly interfere with this objective. A relevant objective to the proposed works for the Large-eared Pied Bat is the protection of all known roost sites (Environment Australia 1999). Known or potential roost sites for the Large-eared Pied Bat do not occur, therefore, the proposed works are consistent with this objective.
<b>Conclusion</b>	<p>The proposed works are not expected to result in significant impacts to the Large-eared Pied Bat and Southern Long-eared Bat as:</p> <ul style="list-style-type: none"> <li>• breeding habitat is absent for both species;</li> <li>• the study area does not contain an important population of the species; and</li> <li>• the study area is part of a large contiguous tract of bushland extending to the east, and is connected to nearby conservation reserves where breeding habitat is available for the Southern Long-eared Bat.</li> </ul>

**Table A.13 Assessment of impact criteria for migratory birds**

Criteria	Discussion
<b>1: substantially modify important habitat</b>	The study area contains a small area (up to 3.39 ha) of potential foraging habitat for the species. However, the species was not detected by detailed past surveys in the locality (Moolarben Biota 2006; EMM 2013). Considering these factors, the proposed works are unlikely to substantially modify an area of important habitat.
<b>2 : result in invasive species</b>	The proposed works are unlikely to result in invasive species that would impact the Regent Honeyeater.
<b>3: disrupt lifecycle of ecologically significant proportion of population</b>	This species has not been recorded in the study area, therefore, the study area is unlikely to contain an ecologically significant proportion of the population.
<b>Conclusion</b>	The proposed works are unlikely to result in significant impacts to the Regent Honeyeater as: <ul style="list-style-type: none"> <li>• an ecologically significant proportion of the species does not reside in the study area;</li> <li>• the species has not been recorded in the study area; and</li> <li>• only a small area of potential foraging habitat will be gradually removed.</li> </ul>

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# Memorandum



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2 September 2013

To | John Arnold  
From | Daniel Weston

Subject | Surface water management infrastructure upgrades – noise assessment

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## 1 Introduction

A detailed noise and vibration study (EMM 2013) was prepared for the Moolarben Coal Project (MCP) Stage 1 Optimisation Modification (MOD9) and is attached as Appendix C to the MOD9 environmental assessment (EA). This memorandum forms an addendum to the study and provides consideration of the potential for additional noise impacts from the surface water management infrastructure upgrades described in the MOD9 response to submissions (RtS) report and shown in Figure 2 (RtS report, Appendix D).

## 2 Assessment method

The assessment method used to assess construction noise emissions from the surface water management infrastructure is largely based on the methods used in the EMM (2013) noise and vibration study. This includes the noise limits, assessment locations, noise enhancing meteorological conditions and noise modelling assumptions and parameters. This assessment has referred to the relevant sections of the EMM (2013) noise and vibration study where appropriate.

It is noted that there will be no additional impact from the operation of the surface water management infrastructure above the approved Stage 1 activities. Therefore, operational noise was not considered in this assessment.

### 2.1 Assessment locations

Noise emissions during construction have been considered at all assessment locations as shown in Figure 5.1a, Figure 5.1b and Table A.1 of the EMM (2013) study.

### 2.2 Noise criteria

Noise from the construction of the surface water management infrastructure upgrades if perceived at off-site assessment locations would be as general operational noise, because the location and character of the activity is similar to the existing mining activities. Therefore, the site's operational noise criteria are appropriate for the assessment of the surface water management infrastructure upgrades.

Noise limits and conditions that apply to operational noise are provided in the MCP Stage 1 Project Approval MP 05\_0117, as modified, which are provided in Section 4.1.1 of the EMM (2013) study. These limits have been used to assess construction noise levels from the proposed surface water management infrastructure upgrades, in combination with mining operations.

## 2.3 Proposed construction hours

The proposed hours of construction are 7:00 am to 5:00 pm Monday to Saturday. Therefore, the daytime noise limits provided in MP 05\_0117 apply.

## 2.4 Acoustically significant construction plant and equipment

Additional plant and equipment will be utilised for the surface water management infrastructure construction. Plant and equipment operation will generally involve loading and transport of onsite surplus fill to form the diversion bunds and sediment dams. The bunds and dams will generally be shaped and formed using a dozer, grader and roller.

Table 1 describes the main noise sources, representative sound power levels, quantities and approximate location considered in this assessment. The sound power level data has been taken from an EMM database and is considered representative of the proposed indicative construction plant and equipment.

**Table 1 Indicative construction plant and equipment quantities and sound power levels**

Item	L <sub>w</sub> , L <sub>eq(15-min)</sub> , dB(A)	Quantity	Indicative location
30 t excavator	106	2	One operating at Emplacement Area 1 One operating at Sediment Dam 10B
30 t articulated dump truck	108	3	One operating between Emplacement Area 1 and Sediment Dam 7 Two operating between Sediment Dam 10B and Sediment Dam 10
D6 dozer	111	1	Operating at Sediment Dam 10
12 t roller	109	1	Operating at Sediment Dam 10
Grader	105	1	Operating at Sediment Dam 10
Watercart	108	1	Operating between Sediment Dam 10B and Sediment Dam 10

## 2.5 Noise enhancing meteorological conditions

The NSW Environmental Protection Authority (EPA), *Industrial Noise Policy (INP)* (2000) provides procedures for identifying and combining prevailing meteorological conditions at a site and assessing the noise levels against relevant criteria.

A summary of noise enhancing meteorological conditions that have been considered in this assessment are presented in Table 2 which are reproduced from Table 5.1 of the EMM (2013) study. It is noted that day-time meteorological conditions apply only as the construction will be limited to between the hours of 7:00 am to 5:00 pm.

**Table 2 Site-specific meteorological parameters**

Assessment condition	Period	Temperature	Wind speed (m/s)/ direction <sup>1</sup>	Relative humidity	Temperature gradient
Calm	Day	20°C	nil	70%	nil
Prevailing winds	Day	20°C	2.5 / NNE (22.5°) 2.7 / NE (45°) 2.7 / ENE (67.5°) 2.6 / E (90°) 2.2 / ESE (112.5°) 2.1 / N (0°)	70%	nil

*Notes:* 1. Wind direction is based on a vector component for the stated direction. Wind speed is based on the upper 10<sup>th</sup> percentile wind speed occurrence at or below 3 m/s. All wind speeds less than 0.5 m/s and greater than 3 m/s were excluded from the analysis in accordance with INP methods.

### 3 Existing environment

Details of the existing acoustic environment including the noise monitoring network surrounding the MCP is provided in Section 3 of the EMM (2013) study.

### 4 Impact assessment

#### 4.1 Construction noise

EMM generated a detailed three-dimensional noise model in the EMM (2013) study. This model was used to predict the potential noise impacts from the construction of the surface water management infrastructure.

Construction is proposed to commence in February 2014 which will fall within the operating indicative Year 2 mine plan as assessed in the EMM (2013) study. Noise levels from the surface water management infrastructure construction have therefore been predicted in isolation and incrementally added to the Year 2 predictions as provided in Table 6.1 of the EMM (2013) study.

The plant and equipment locations selected for the noise model represent worst case operating positions in relation to surrounding assessment locations and identified noise enhancing meteorological conditions. These positions were described previously in Table 1. All plant and equipment has been assumed to operate continuously throughout a 15 minute assessment period and, therefore, noise levels presented are considered conservative.

Noise prediction results are summarised in Table 3. As described previously, noise levels were predicted for all assessment locations as shown in Figure 5.1a, Figure 5.1b and Table A.1 of the EMM (2013) study. The vast majority of assessment locations, however, are significantly distanced from construction activity, resulting in negligible predicted noise levels. Furthermore, noise level predictions during calm conditions were found to be negligible at all assessment locations. In order to simplify the presentation of results, assessment locations with predicted external construction noise levels of greater than 20 dB(A), which occurred during worst case meteorological conditions, have been provided only.

**Table 3 Predicted MCP indicative Year 2 operating noise levels with surface water infrastructure construction**

Assessment location	Description	MP05_0117 criteria, Day	Predicted noise level during worst case meteorological conditions, dBA, $L_{eq, 15 \text{ min}}$		
			Stage 1 extension modification <sup>2</sup>	Surface water management infrastructure construction	Combined noise levels (change to overall Stage 1 extension modification noise level)
9	Commercial	65	28	21	29 (+1)
11 (lot 21) <sup>3</sup>	Private residence	35	<30	<20	<30
11 (lot 1) <sup>3</sup>	Commercial	65	<30	<20	<30
11 (lot 26) <sup>3</sup>	Commercial	65	<30	<20	<30
26	Commercial	65	38	22	38 (0)
46B	Commercial	65	44	24	44 (0)
58	Private residence	35	35	20	35 (0)
63	Private residence	38	35	20	35 (0)
66	Commercial	65	43	24	43 (0)
149	Commercial	65	44	25	44 (0)
151	Catholic church <sup>1</sup>	35	34	14	34 (0)
160	School <sup>1</sup>	35	35	16	35 (0)

**Table 3 Predicted MCP indicative Year 2 operating noise levels with surface water infrastructure construction**

Assessment location	Description	MP05_0117 criteria, Day	Predicted noise level during worst case meteorological conditions, dBA, L <sub>eq</sub> , 15 min		
			Stage 1 extension modification <sup>2</sup>	Surface water management infrastructure construction	Combined noise levels (change to overall Stage 1 extension modification noise level)
162	Commercial	65	43	24	43 (0)
168	Catholic church <sup>1</sup>	35	35	16	35 (0)
180	Private residence	35	32	20	32 (0)
181	Private residence	35	31	20	31 (0)
182	Private residence	35	32	20	32 (0)
255	Private residence	35	32	22	32 (0)
258	Private residence	35	34	23	34 (0)
300	Private residence	35	29	20	30 (+1)
306	Private residence	35	29	20	30 (+1)
317	Private residence	35	28	20	29 (+1)

Notes: 1. An 8 dB(A) reduction has been applied to provide a conservative internal noise level prediction for direct comparison to MP05\_0117 noise criteria.  
 2. Results from Table 6.1 of the EMM (2013) study.  
 3. Predicted noise levels at assessment location 11 are negligible however they have been shown due to the proximity of this assessment location to the surface water management infrastructure upgrades.

Noise predictions show that the combined indicative Year 2 operational and surface water management infrastructure construction noise levels are below MP 05\_0117 noise limits during worst case meteorological conditions.

A minor increase of 1 dB(A) from noise levels predicted in the EMM (2013) study has been identified at assessment locations 9, 300, 306 and 317. This increase would not be discernible to the human ear at these assessment locations. Further, total site noise is predicted to be at or below background noise levels at these assessment locations.

In isolation, the predicted construction noise levels are relatively lower again, typically less than 25 dB(A) which is significantly less than existing background noise levels in the area and close to the ‘noise floor’ limit of what can be measured in the field.

## 4.2 Road traffic generation

The surface water management infrastructure construction will require supply of additional fill which will be sourced and delivered from the local area. Delivery vehicles will typically travel north from Mudgee, NSW using Ulan Road. A small number of construction workers will be required for construction and it is anticipated these workers would also use Ulan Road to access the site.

The existing day-time traffic volume on Ulan Road (ie which is located near the majority of residential assessment locations) is approximately 2,300 vehicles per day.

The additional worst case daily construction traffic has been estimated at eight light vehicle movements (construction workers) and 14 heavy vehicle movements (product deliveries) per day. The 22 additional movements will attribute to a 1% increase in traffic volumes on these roads during construction. This will create a negligible noise level increase of less than 0.1 dB(A) on Ulan Road and will not result in additional road traffic noise impacts.



## 5 Environmental noise management

No additional management and monitoring measures beyond those listed in Section 7.1 of the EA are required as a result of the surface water management infrastructure upgrades.

## 6 Conclusion

Construction will occur during daytime hours only over a period of approximately six months, planned to commence in February 2014. This coincides with the indicative Year 2 mine plan assessed in the EMM (2013) study.

Noise modelling indicates that the short term construction activities required to upgrade the surface water management infrastructure that will be carried out simultaneously with general mining operations will not result in increased noise levels at the vast majority of receivers. The exception being a marginal 1 dB(A) increase at assessment locations 9, 300, 306 and 317; however, such a change would be indiscernible to the human ear at these assessment locations. There will be no increased noise levels above approved MP 05\_0117 Noise Impact Assessment Criteria as a result of the activities.





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2 September 2013

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**RE: Air Quality Assessment – Surface water management infrastructure upgrades**

Dear John,

A detailed air quality impact assessment (Todoroski Air Sciences (TAS) 2013) was prepared for the Moolarben Coal Project (MCP) Stage 1 Optimisation Modification (MOD9) and is attached as Appendix D to the MOD9 environmental assessment (EA). This letter provides an assessment of the potential for air quality impacts from the surface water management infrastructure upgrades described in the MOD9 response to submissions (RtS) report (EMM 2013) and shown in Figure 2 (RtS report, Appendix D). This assessment is provided as an addendum to the TAS (2013) assessment.

This assessment provides a direct comparison with the indicative Year 2 EA mine plan as this year would best correspond with the timing of the upgrade works.

From an air quality perspective, the only significant effect that the proposed upgrades would have is to add some additional dust generated over a limited construction period.

**Potential for dust emissions**

The proposed upgrades would involve the temporary disturbance of the areas around the MCP main infrastructure area. The construction activity is assumed to occur over a relatively short timeframe of approximately six months and would require a small amount of additional plant equipment. The equipment for this work would be typical of that used for roadway repair projects, or building construction projects, i.e. road going trucks and plant items.

For the purposes of this assessment, a relatively short six month construction period was assumed as this maximises the rate of activity and dust generated in any 24-hour period. Additionally, it was also assumed that this high rate of construction activity continues for each

hour that construction activity could occur (7 am to 5 pm) for a whole year. These conservative assumptions would overestimate the predicted effects of the upgrade work, which in reality would be likely to occur at a slower pace, with less dust in any period of time.

Materials required for the upgrades would be primarily sourced on-site with the majority of excess spoil material generated from the dam excavation used for bund construction.

Potential dust emissions may be generated during the construction process from the loading, transport, emplacement and shaping operations. In addition, windblown dust may be generated from the construction area during periods of high wind speeds.

The estimated dust emissions for all proposed upgrades are presented in **Table 1** and the corresponding emission factors from the US EPA AP42 Emission Factors (**USEPA, 1985 and Updates**) and the State Pollution Control Commission document "*Air Pollution from Coal Mining and Related Developments*" (**SPCC, 1983**) that were applied to estimate the potential dust emissions are outlined below the table.

**Table 1: Estimated TSP emission rate for construction period**

Activity	TSP emissions (kg during construction period)
Excavator loading material to haul truck - Cockies Dam	90
Hauling to Rail Loop Stabilisation Batter	264
Hauling to Emplacement Area 1	478
Emplacing at Rail Loop Stabilisation Batter	23
Emplacing at Emplacement Area 1	67
Excavator loading material to haul truck - Sediment Dam SD14	31
Hauling to Cleanwater Diversion Bund 1	249
Emplacing at Cleanwater Diversion Bund 1	729
Excavator loading material to haul truck from Unsuitable Stockpile 1	130
Hauling to Diversion Bund 1 from Unsuitable Stockpile 1	2,794
Emplacing at Cleanwater Diversion Bund 1	130
Excavator loading material to haul truck from Unsuitable Stockpile 2	36
Hauling to Diversion Bund 1 from Unsuitable Stockpile 2	766
Emplacing at Cleanwater Diversion Bund 1	36
Excavating material - Sediment Dam SD7	2
Excavating material - Sediment Dam S10B	39
Hauling to Emplacement	280
Emplacing at Emplacement	39
Excavating material - Diversion Bund 2	7
Dozers on material	13,388
Grading on material	308
Wind erosion of exposed surfaces	39,461
<b>Total</b>	<b>59,347</b>

### Loading/Unloading overburden material

$$EF_{TSP} = k \times 0.0016 \times \left( \left( \frac{u}{2.2} \right)^{1.3} / \left( \frac{M}{2} \right)^{1.4} \right) \text{ kg/tonne}$$

Where  $k = 0.74$ ,  $u =$  wind speed (m/s),  $M =$  moisture content (%)

### Hauling overburden material

$$EF_{TSP} = \left( \frac{0.4536}{1.6093} \times \left( \frac{s}{12} \right)^{0.7} \times 4.9 \times \left( M \times \frac{1.1023}{3} \right)^{0.45} \right) \text{ kg/VKT}$$

Where  $s =$  silt content (%),  $M =$  average GVM of haul truck (tonnes)

### Dozer activity

$$EF_{TSP} = \frac{2.6(s^{1.2})}{M^{1.3}}$$

Where  $s =$  silt content (%),  $M =$  moisture content (%)

### Grading activity

$$EF_{TSP} = 0.0034(s)^{2.5}$$

Where  $s =$  mean vehicle speed (km/h)

When comparing the estimated construction dust emissions presented in **Table 1** with the estimated total dust emissions for the Year 2 operations (**TAS, 2013**), it was found that the maximum quantity of construction dust would equate to approximately 2% of the total dust generated by the entire mine operations.

### **Assessment of potential dust impacts**

The approach taken in the assessment was to predict the potential additional dust impacts associated with the proposed upgrades in conjunction with the MCP. The existing dust dispersion model (**TAS, 2013**) was re-run, including the potential maximum dust emissions as outlined in **Table 1** for the proposed upgrades.

### **Results**

The dispersion modelling results are presented in **Figure 1** to **Figure 4** showing the predicted maximum 24-hour average  $PM_{10}$ , annual average  $PM_{10}$ , TSP and dust deposition levels, respectively. The predicted levels are overlaid with the predictions for indicative Year 2 of the **TAS (2013)** assessment so that a direct comparison of the potential change can be clearly seen.

The results indicate a slight increase in potential dust impacts in the area near the proposed upgrade works. The results also show that there is no discernable change in predicted impacts for areas in the far-field and in particular at any sensitive receptor locations.

The figures show that the predicted dust levels are unlikely to change at any sensitive receptor as a result of the proposed upgrades in comparison with the results presented in the TAS (2013) assessment.

### **Conclusion**

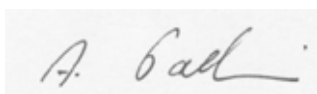
The assessment estimates that activities associated with the short term construction activities may generate up to 2% of the level of dust associated with the MCP (i.e. all proposed existing and future mining activities).

By direct modelling and comparison with the levels predicted in the TAS (2013) assessment during indicative Year 2 (i.e. for all mining activities), the assessment shows that the construction activities associated with the upgrades would only influence dust levels in the local vicinity of the works, and that dust levels are not predicted to change at any sensitive receptor as a result of the proposed upgrades.

Therefore, no additional management and monitoring measures beyond those listed in Section 9.4 of the EA are required as a result of the proposed upgrades.

Yours faithfully,

Todoroski Air Sciences



Aleks Todoroski



Philip Henschke

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## References

SPCC (1983)

“Air Pollution from Coal Mining and Related Developments”, State Pollution Control Commission.

TAS (2013)

“Moolarben Coal Project Stage 1 Optimisation Modification – Air Quality and Greenhouse Gas Assessment”, prepared by Todoroski Air Sciences for EMGA Mitchell McLennan, May 2013.

US EPA (1985 and updates)

“Compilation of Air Pollutant Emission Factors”, AP-42, Fourth Edition United States Environmental Protection Agency, Office of Air and Radiation Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711.

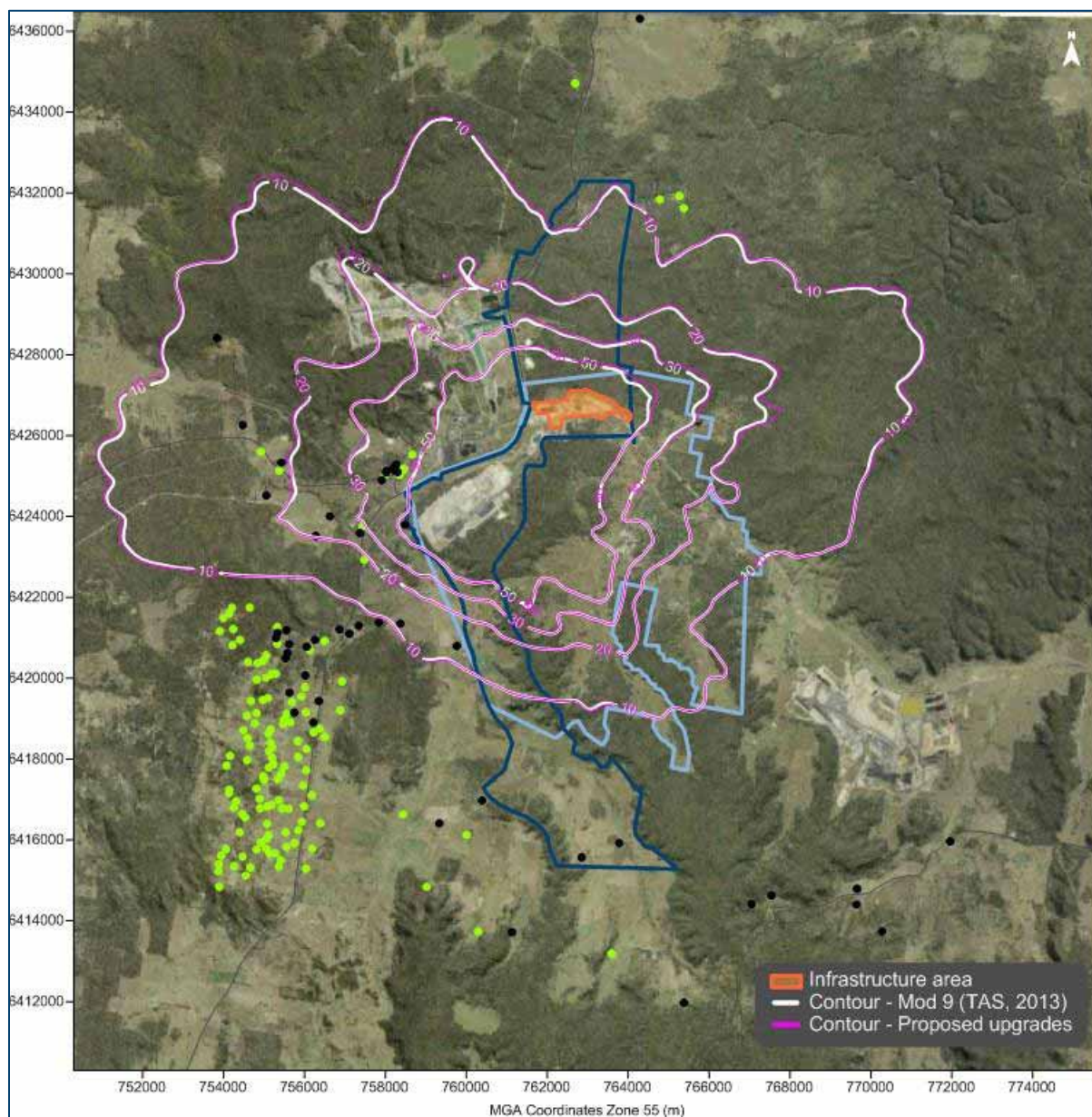


Figure 1: Comparison of predicted maximum 24-hour average PM<sub>10</sub> concentrations (µg/m<sup>3</sup>)



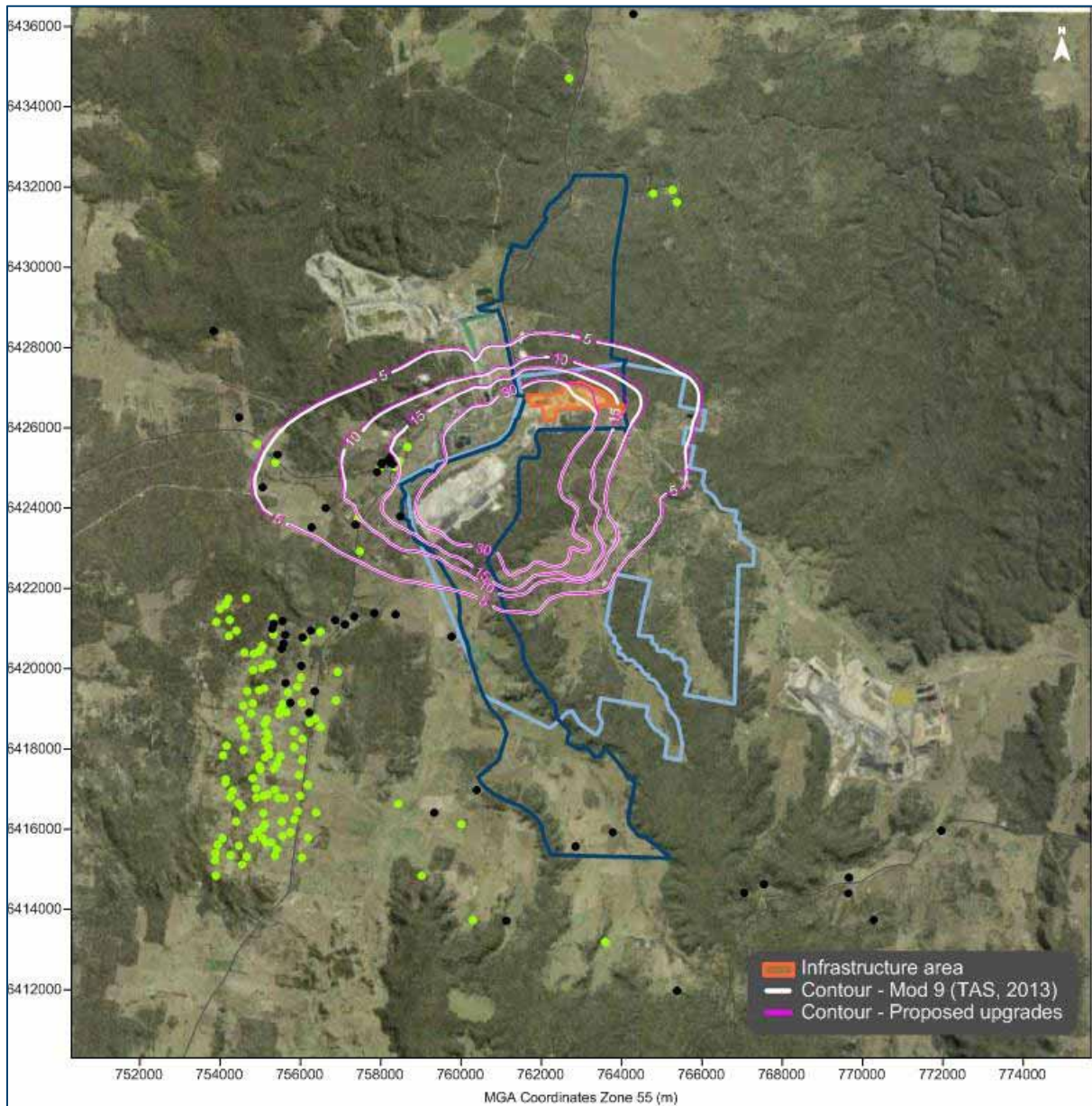


Figure 2: Comparison of predicted annual average PM<sub>10</sub> concentrations (µg/m<sup>3</sup>)

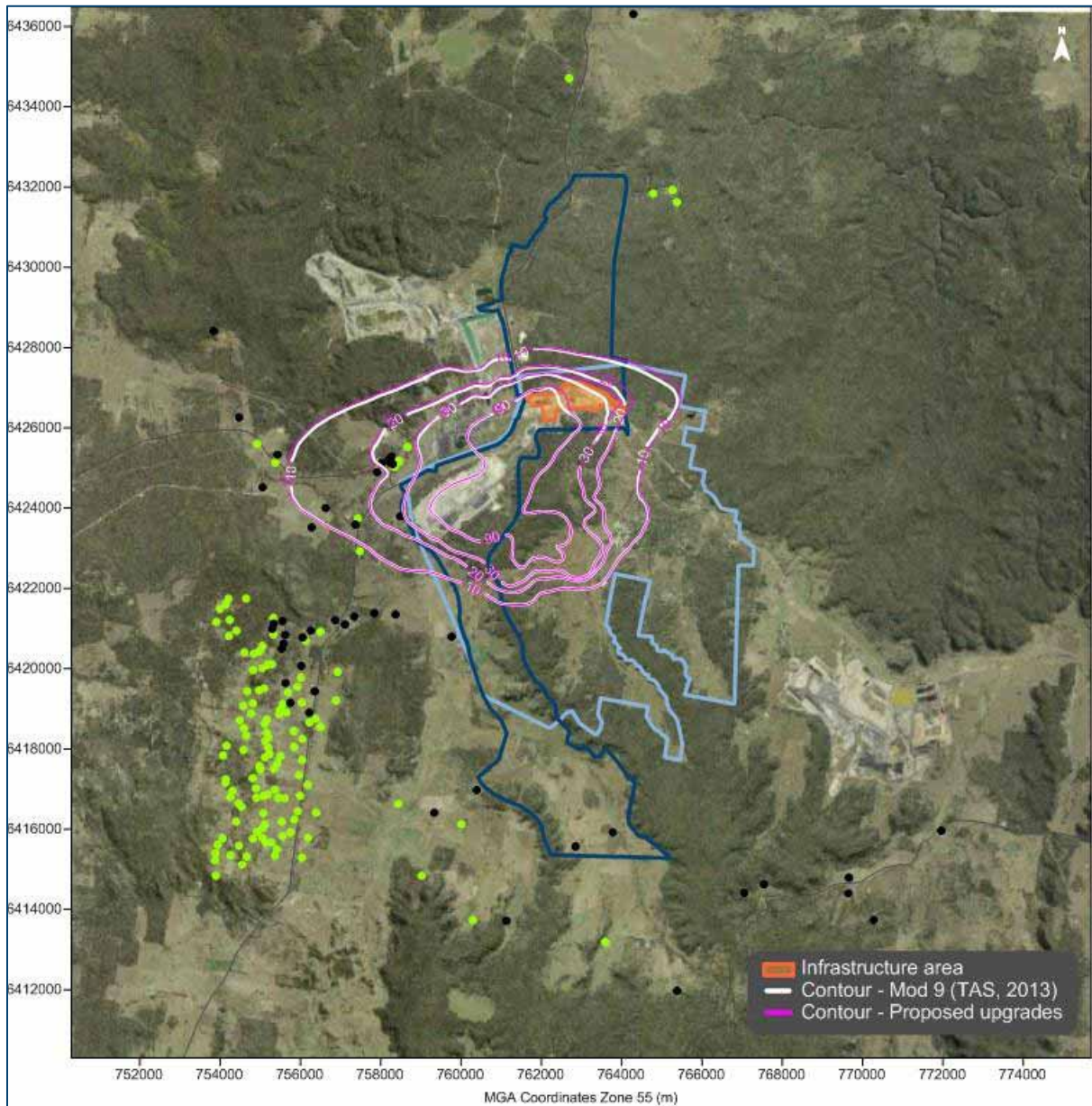


Figure 3: Comparison of predicted annual average TSP concentrations ( $\mu\text{g}/\text{m}^3$ )

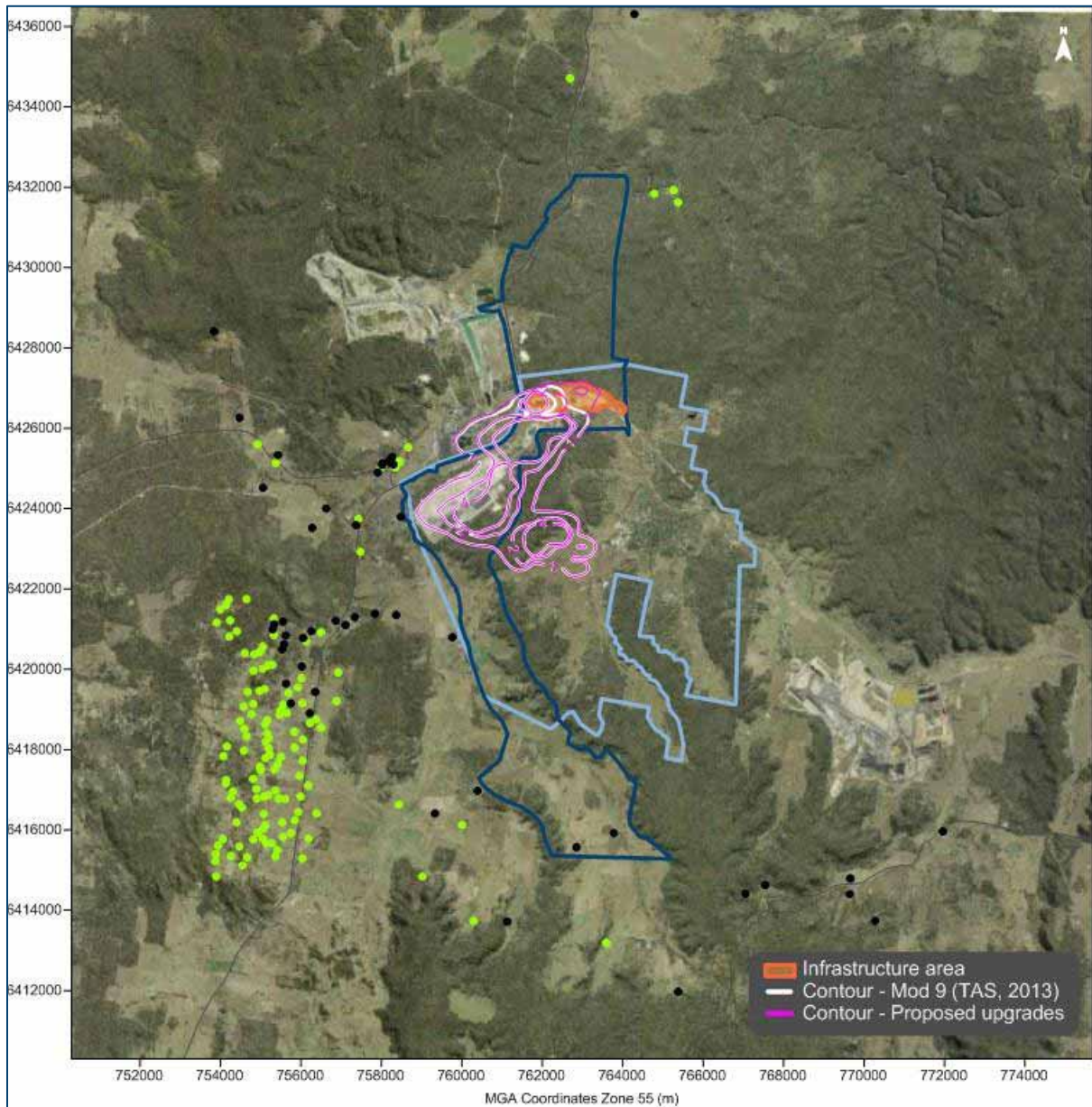


Figure 4: Comparison of predicted annual average dust deposition levels (g/m<sup>2</sup>/month)



## Appendix G

### Noise and vibration impact assessment (addendum)

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27 September 2013

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Re: Moolarben Coal Project (MCP) Stage 1 Optimisation Modification (MOD9) - Noise and vibration impact assessment (addendum) – Year 24 operating scenario

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## 1 Introduction

This letter report summarises the method and results of additional noise modelling conducted in the southern extent of Open Cut 3 for the Stage 1 Optimisation Modification (MOD9). It forms an addendum to the detailed noise and vibration study, prepared by EMM for the MOD9 environmental assessment (EA). Hence, this assessment together with the EMM 2013 study (i.e. Stage 1 MOD9 noise impact assessment) provides the worst case predicted noise impact footprint for the site.

The additional noise modelling and assessment was completed at the request of the NSW Department of Planning and Infrastructure (DP&I). This additional modelling quantifies the noise impacts in mine year 24 at the southern extent of Open Cut 3 and follows the approach adopted in the EMM 2013 study. This includes the noise limits, assessment locations, noise enhancing meteorological conditions and noise modelling assumptions and parameters used in the earlier study. Reference is made to the relevant sections of the EMM 2013 study where appropriate. Note that the adopted modelling approach is generally consistent with that used in the Stage 2 Preferred Project Report (PPR) noise and vibration impact assessment – ref: Stage 2 Noise Modelling Environmental Noise Assessment, Global Acoustics 2012.

## 2 Criteria

The existing approved Stage 1 noise impact assessment criteria are applicable to this assessment and are reproduced for reference in Section 4 of the EMM 2013 study.

## 3 Noise modelling method

### 3.1 Assessment locations

Assessment locations are consistent with that previously reported and include known private (residences and vacant land holdings), commercial, school and church properties in areas surrounding the mine. Assessment locations are listed in Appendix A and shown in Figure 5.1a and 5.1b of the EMM 2013 study. All mine owned properties have been excluded from the assessment.

## 3.2 Meteorology

A summary of calm and worst case identified prevailing weather conditions considered typical of the area and used in the noise modelling are provided in Table 5.1 of the EMM 2013 study.

## 3.3 Additional operating scenario – Year 24 Operations

An additional scenario has been modelled to quantify operational noise levels from plant and equipment operating within the southern extent of Open Cut 3 (indicative of mine year 24). The assessment incorporates the proposed Stage 2 mine year 24 operating scenario to enable quantification of worst case noise levels for the Moolarben mine complex. This approach (ie considering all approved and proposed Moolarben project components) was adopted to provide the proponent and DP&I with an understanding of the complex's entire predicted noise impacts.

The location of open cut mining operations and plant positions are shown graphically in Figure 1. Note that haul trucks (as per the quantities provided in Table 1) have been modelled as a moving point source on the haul roads and are therefore not specifically identified as separate discrete plant locations in Figure 1. The location of plant and equipment is generally consistent with that shown in Figure C.6 in the Stage 2 PPR noise study (Global Acoustics 2012).

All fixed plant and equipment such as the coal handling and process facilities have been assumed to be operating continuously in any 15 minute period, 24 hours a day. Key mobile plant activities have been modelled as follows:

- one excavator loading coal in Open Cut 3. Coal haulage from the Open Cut 3 load location to the ROM coal stockpile;
- two excavators loading coal and waste rock in Open Cut 4. Coal haulage from the Open Cut 4 coal loading locations to the ROM coal stockpile. Waste rock haulage and emplacement behind the active mining areas;
- dozers operating at all excavator, dump and rehabilitation locations;
- drills operating on the advancing upper bench in Open Cuts 3 and 4;
- graders and water carts working continuously on haul roads; and
- coal loading at the rail load out bin.

## 3.4 Plant and equipment noise levels

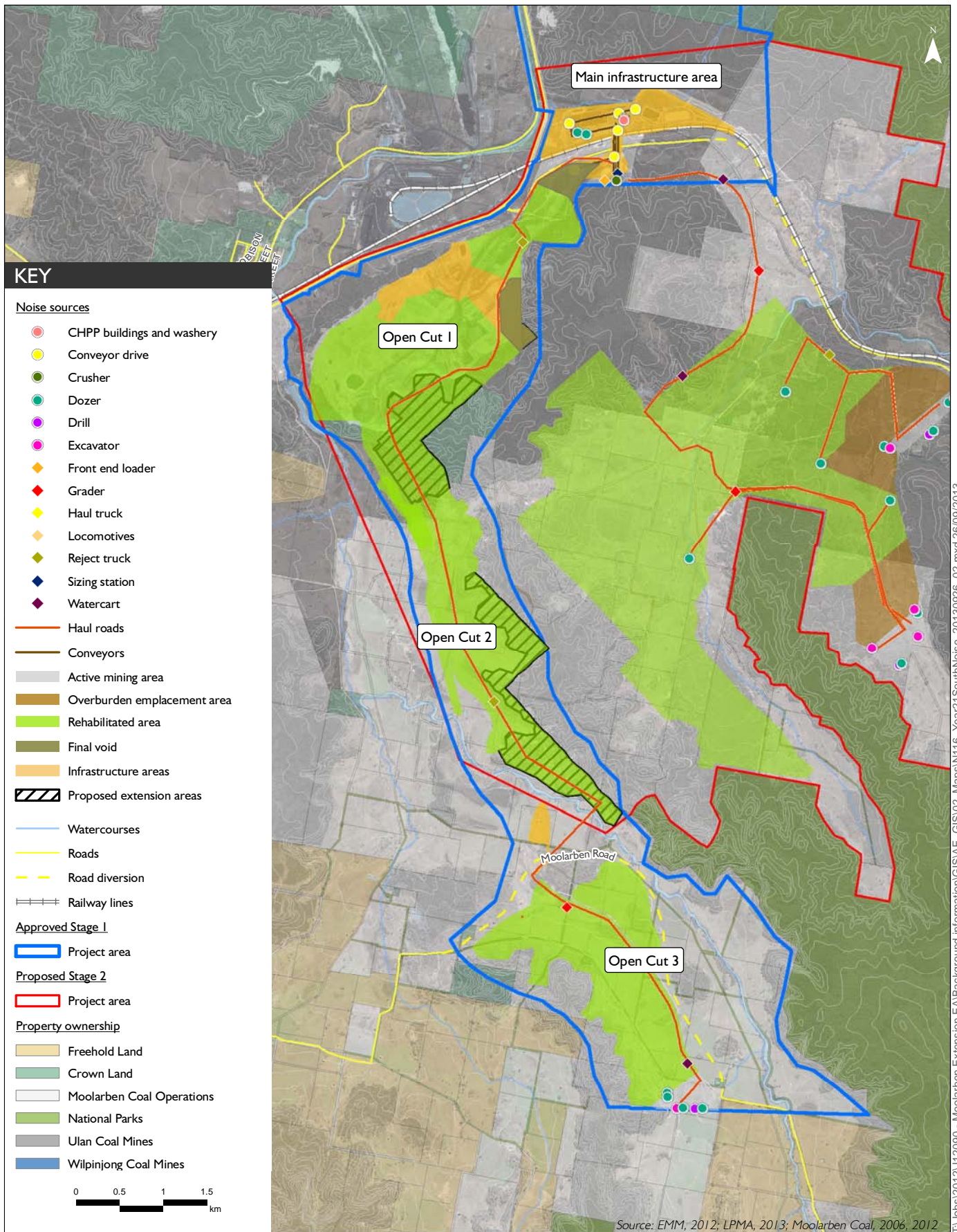
The noise sources, quantities and representative sound power levels of plant items assessed for the Year 24 operating scenario are provided in Table 1 and are consistent with that provided in Table 5.2 of the EMM 2013 study. (Note octave band sound power level data is provided in Appendix C of the EMM 2013 study).



**Table 1 Indicative plant and equipment quantities and sound power levels**

Item	Lw, L <sub>eq(15-min)</sub> , dB(A)	Quantity (Day, evening and night operation)
		Year 24
Haul trucks	115	22
Excavator	118	6
Dozer	114	15
Grader	112	3
Water truck	114	3
Front End Loader	120	1
Haul truck (Rejects)	115	3
Drill	120	3
CHPP module 1(SW Facade)	116	1
CHPP building 2	108	1
CHPP building 3	90	1
Sizing station	114	1
ROM crusher	113	1
Overland conveyor	81 <sup>1</sup>	10
Conveyor drive	102-107	6
Ventilation fans	112	0
Locomotive	108	3

Notes: 1. Sound power level per linear metre - 10 separate conveyors of varying lengths used in all stages.  
 2. Sound power level data for plant and equipment were extracted from a recent noise report, "Stage 2 Noise Modelling Environmental Noise Assessment" by Global Acoustics.



**Year 24 modelled noise source locations**  
 Moolarben Coal Project - Stage I Optimisation Modification  
 Noise and vibration impact assessment

Figure 1

## 4 Results

### 4.1 Operational noise

The predicted noise levels for each meteorological condition during the Year 24 operational scenario are provided in Table 2 for privately owned residential, commercial, school and church assessment locations. The predictions are for assessable meteorology being calm and prevailing (winds or inversion) conditions as described in Section 5.3.3 of the EMM 2013 study. Note, assessment locations with predicted noise levels less than 30 dB(A) for all years for all assessed meteorological conditions have been omitted from Table 2.

An assessment of drainage flow winds for applicable assessment locations is provided in Section 6.1.1 of the EMM 2013 study. This assessment remains valid as drainage flow winds do not apply for assessment locations near Open Cut 3 due to the surrounding intervening topography.

For school and church assessment locations, a facade reduction of 8 dB(A) has been applied to predicted external noise levels to provide direct comparison with internal noise criteria nominated in MP 05\_0117. This 8 dB(A) reduction is considered conservative, as generally a facade with windows open will provide 10 dB of noise reduction.

The shading in Table 2 indicates assessment locations where noise levels are predicted to exceed the approved Stage 1 noise impact assessment criteria. The results identify one assessment location (ID 30) which is predicted to experience an exceedance of 2 dB(A) above the relevant criteria. As described in the EMM 2013 study, this assessment location is predicted to experience an exceedance of 4 dB(A) above the approved Stage 1 noise impact assessment criteria in Year 21.

Noise contours have been prepared for calm and noise enhancing (i.e. worst case prevailing) meteorological conditions and provide a visual guide of potential operational noise levels in relation to existing approved Stage 1 noise limits (Figure 2). The contours represent the indicative maximum of day and night noise levels for this additional modelling scenario.

**Table 2** Predicted operational noise levels - dB(A),  $L_{eq(15-min)}$

ID	Criteria D/E/N <sup>1</sup>	Year 24		
		Calm	Prevailing <sup>2</sup>	
		D/E/N	Day	Night
9	65/65/65	<30	40	40
26	65/65/65	<30	37	37
30	35/35/35	<30	37	37
31	35/35/35	<30	35	34
35	35/35/35	<30	33	31
37	35/35/35	<30	30	<30
39	35/35/35	<30	30	<30
40	35/35/35	<30	31	30
41B	35/35/35	<30	32	32
46B	65/65/65	35	42	42
47	35/35/35	<30	33	31
58	35/35/35	<30	35	35
59	35/35/35	<30	32	32
61	35/35/35	<30	30	30
63 <sup>4</sup>	38/38/37	<30	36	36
66	65/65/65	35	42	42

**Table 2** Predicted operational noise levels - dB(A),  $L_{eq}(15\text{-min})$

ID	Criteria D/E/N <sup>1</sup>	Year 24		
		Calm	Prevailing <sup>2</sup>	
			D/E/N	Day
70	35/35/35	<30	35	35
75	35/35/35	<30	34	34
76	35/35/35	<30	34	33
79	35/35/35	<30	32	32
80	35/35/35	<30	32	31
82	35/35/35	<30	30	30
83	35/35/35	<30	31	30
86	35/35/35	<30	31	30
87	35/35/35	<30	30	<30
88	35/35/35	<30	30	<30
89	35/35/35	<30	31	30
90	35/35/35	<30	31	30
91	35/35/35	<30	30	<30
94	35/35/35	<30	30	30
95	35/35/35	<30	31	30
96	35/35/35	<30	31	30
97	35/35/35	<30	31	30
98	35/35/35	<30	31	30
99	35/35/35	<30	31	30
100	35/35/35	<30	31	31
101	35/35/35	<30	31	31
101	35/35/35	<30	31	30
102	35/35/35	<30	31	30
103	35/35/35	<30	30	30
104	35/35/35	<30	30	30
105	35/35/35	<30	30	<30
106	35/35/35	<30	31	30
107	35/35/35	<30	31	31
109	35/35/35	<30	31	30
110	35/35/35	<30	31	30
111	35/35/35	<30	30	30
149	65/65/65	36	42	43
151 <sup>3</sup> (Church)	35/35/-	<30	33	33
160 <sup>3</sup> (School)	35/-/-	<30	34	34
162	65/65/65	35	42	42
168 <sup>3</sup> (Church)	35/35/-	<30	34	34
180	35/35/35	<30	34	33
181	35/35/35	<30	33	33
182	35/35/35	<30	33	33
183	35/35/35	<30	31	30
184	35/35/35	<30	33	32
185	35/35/35	<30	32	32
186	35/35/35	<30	31	30
187	35/35/35	<30	32	31

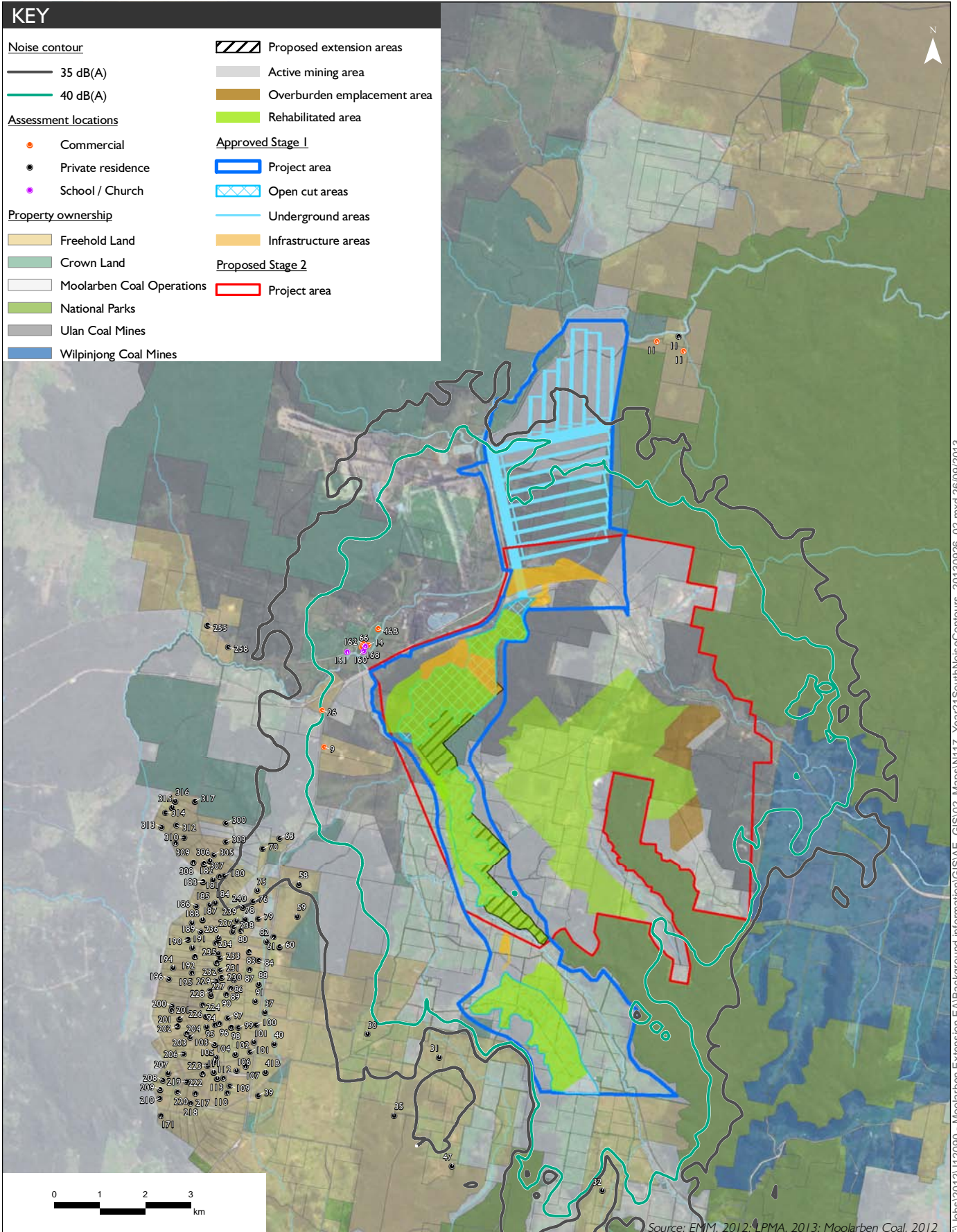
**Table 2** Predicted operational noise levels - dB(A),  $L_{eq}(15\text{-min})$

ID	Criteria D/E/N <sup>1</sup>	Year 24		
		Calm	Prevailing <sup>2</sup>	
		D/E/N	Day	Night
189	35/35/35	<30	31	31
192	35/35/35	<30	31	30
204	35/35/35	<30	30	<30
217	35/35/35	<30	30	<30
222	35/35/35	<30	30	<30
223	35/35/35	<30	30	<30
224	35/35/35	<30	31	30
226	35/35/35	<30	31	30
227	35/35/35	<30	31	30
228	35/35/35	<30	30	30
229	35/35/35	<30	31	31
230	35/35/35	<30	31	31
231	35/35/35	<30	31	31
232	35/35/35	<30	30	30
233	35/35/35	<30	31	30
234	35/35/35	<30	31	30
235	35/35/35	<30	31	31
236	35/35/35	<30	31	31
237	35/35/35	<30	32	31
238	35/35/35	<30	32	31
239	35/35/35	<30	32	32
240	35/35/35	<30	33	32
255	35/35/35	<30	31	31
258	35/35/35	<30	33	33
300	35/35/35	<30	30	30
303	35/35/35	<30	31	31
305	35/35/35	<30	30	<30
306	35/35/35	<30	30	30
307	35/35/35	<30	30	30

- Notes:
1. D/E/N = Day / Evening / Night
  2. The value shown is the maximum predicted noise level from all assessed wind and temperature inversion conditions.
  3. An 8 dB(A) reduction has been applied to provide a conservative internal noise level prediction for direct comparison to MP 05\_0117 noise criteria.
  4. MCO currently has a noise agreement with this property owner that will take affect when Stage 2 is approved.

# KEY

- |                             |                             |
|-----------------------------|-----------------------------|
| <b>Noise contour</b>        | Proposed extension areas    |
| 35 dB(A)                    | Active mining area          |
| 40 dB(A)                    | Overburden emplacement area |
| <b>Assessment locations</b> | Rehabilitated area          |
| Commercial                  | <b>Approved Stage 1</b>     |
| Private residence           | Project area                |
| School / Church             | Open cut areas              |
| <b>Property ownership</b>   | Underground areas           |
| Freehold Land               | Infrastructure areas        |
| Crown Land                  | <b>Proposed Stage 2</b>     |
| Moolarben Coal Operations   | Project area                |
| National Parks              |                             |
| Ulan Coal Mines             |                             |
| Wilpinjong Coal Mines       |                             |



Source: EMM, 2012; PMA, 2013; Moolarben Coal, 2012

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## 4.2 Privately owned land

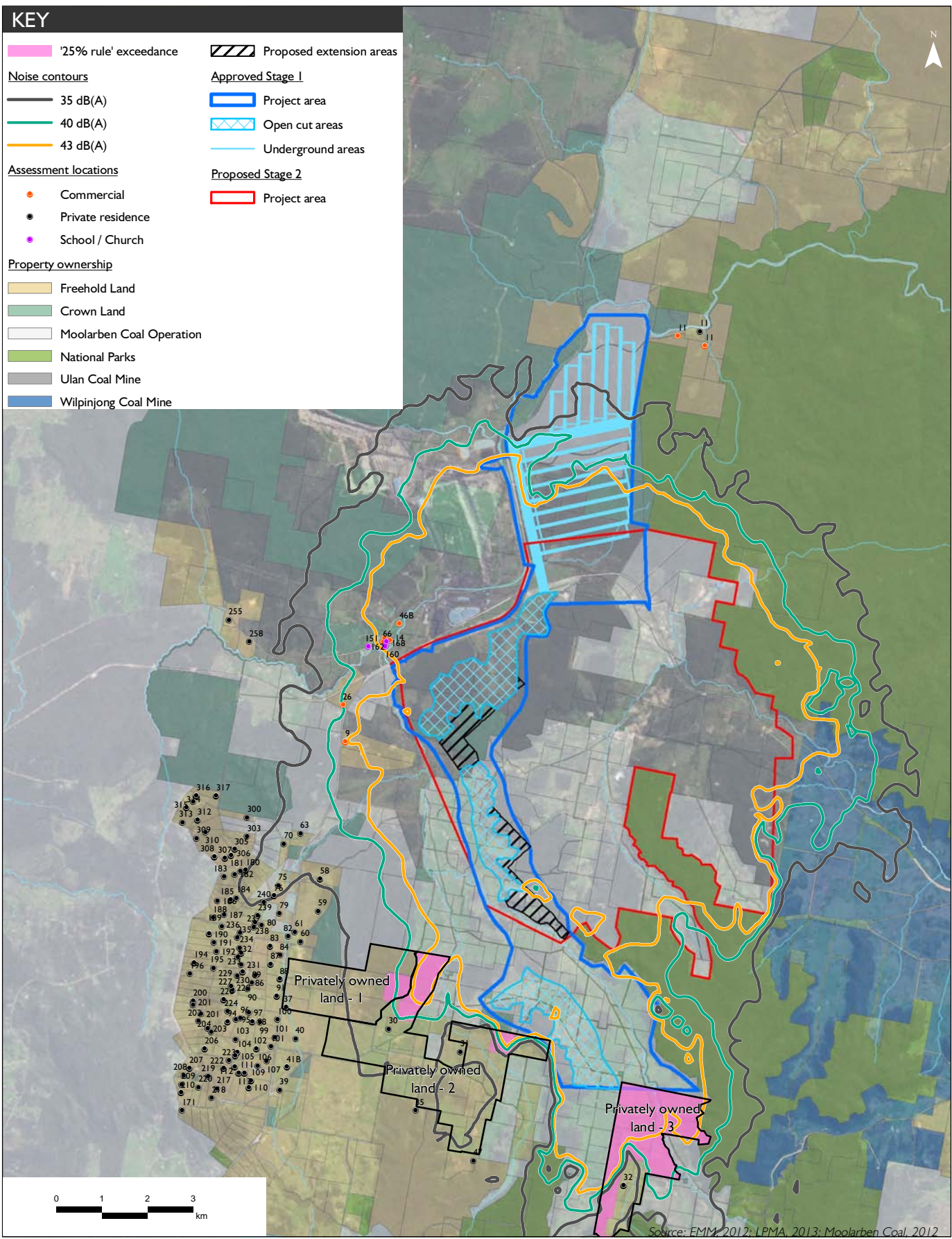
The  $L_{eq(15-min)}$  noise contours derived from all five indicative operational stages (as previously provided in the EMM 2013 study) for adverse weather conditions together with this addendum for Open Cut 3 southern extent operating scenario are presented in Figure 3. This assessment supersedes that provided in Section 6.2 of the EMM 2013 study.

This addendum found an additional private landholder, with 14 individual lots listed in Table 3, predicted to experience noise levels of greater than 40 dB(A), on more than 25% of the individual lot land area (Privately owned land – 3, ID 32). This also equates to greater than 25% of the total property land area potentially being impacted by noise levels above 40 dB(A) which would provide this property owner with acquisition rights under the current conditions of approval (MP 0 5\_0117).

Individual lots identified within Privately owned land 1 and 2, with noise levels of greater than 40 dB(A) on more than 25% of the individual lot land area, remain as identified in the EMM 2013 study.

**Table 3 Privately owned land identified to be within the affectation zone**

ID	Lot//DP Number
Privately owned land – 1 (ID 37)	224//755442
	7//115031
Privately owned land – 2 (ID 30)	112//755442
	114//755442
	124//755442
	111//755442
	162//755442
	208//755442
	67//755442
Privately owned land – 3 (ID 32)	76//755442
	105//755442
	4//575167
	97//755442
	250//755442
	59//755442
	66//755442
	58//755442
	207//755442
	88//755442
65//755442	



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**Predicted noise levels on privately owned land parcels  
(worst case meteorological conditions, all years,  $L_{eq(15-min)}$  dB(A))**



### 4.3 Sleep disturbance, low frequency noise and cumulative noise

Predicted operational noise levels presented in this addendum are similar to those predicted for the previous MOD9 modelled operational scenarios at all assessment locations (ie generally less than or at most 1 dB(A) above MOD9 operational scenarios). The results of the sleep disturbance, low frequency and cumulative noise assessment presented in Section 6.3, 6.4 and 6.5 of the EMM 2013 study, respectively, are therefore considered representative. On this basis sleep disturbance, low frequency and cumulative noise impacts from this addendum are considered unlikely at all assessment locations.

## 5 Conclusion

A further operational scenario has been modelled to ensure the MOD9 noise assessment fully considers the potential revised worst case cumulative noise impacts for the Stage 1 and proposed Stage 2 projects combined.

The modelling results identified that assessment location ID 30 is predicted to experience a minor (ie 2 dB(A)) exceedance of existing approved noise levels in Year 24. This assessment location was previously predicted to experience a moderate (ie 4 dB(A)) exceedance of existing approved noise levels in Year 21. The additional modelling also identified that private landholder ID 32 is predicted to experience noise levels greater than 40 dB(A) on more than 25% of the total property land area (including on 14 individual lots), but not at the location of the residence on this property.

Generally, predicted operational noise levels during worst case meteorological conditions over the day and night periods are similar to those predicted for the previous corresponding MOD9 modelled operational scenarios at all assessment locations. Given this, sleep disturbance, low frequency and cumulative noise levels are considered representative to those discussed in the EMM 2013 study.

Yours sincerely



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