



Moolarben Coal Mine

*Major Project
Modification
Assessments*

05_0117 MOD 14

08_0135 MOD 3



February 2019

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Cover photo

Moolarben Coal Mine (Source: Yancoal)

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Executive Summary

The Moolarben Coal Mine is an open cut and underground coal mine located about 40 kilometres northeast of Mudgee, which along with the Ulan and Wilpinjong Coal Mines forms part of a large coal mining complex in the Mid-Western Region.

The Moolarben Coal Mine is operated by Moolarben Coal Operations Pty Ltd (Moolarben Coal) and comprises four approved open cut mining areas (OC1 to OC4), three approved underground mining areas (UG1, UG2 and UG4) and other mining related infrastructure (including coal processing and transport facilities).

The mine commenced operations in 2008, and it now operates under two integrated project approvals granted by the then Minister for Planning in 2007 (Stage 1) and by the Planning Assessment Commission in 2015 (Stage 2).

Under these approvals, Moolarben Coal is allowed to extract a combined total of 21 million tonnes of run-of-mine (ROM) coal a year until 2038 from its open cut and underground operations, process the coal at an existing coal handling and preparation plant (CHPP) at the mine, and export it to domestic and export markets by rail using the Gulgong to Sandy Hollow Railway line.

Moolarben Coal is seeking to increase its open cut coal production limits and optimise its coal processing and handling activities with limited changes to its currently approved mining operations. To do this, it has lodged concurrent applications to modify the Stage 1 and Stage 2 project approvals.

Proposed Modifications

The key aspects of the proposed modifications include:

- increasing the combined annual run-of-mine (ROM) coal production limits from the Stage 1 and Stage 2 open cut pits from 13 to 16 million tonnes a year;
- revisions to the pit boundary limits of two of the Stage 1 open cut pits (OC2 and OC3);
- minor changes to the approved Stage 1 and Stage 2 surface infrastructure;
- installing a reverse-osmosis water treatment facility and associated infrastructure to reduce the salinity of discharged water; and
- relocating the existing licensed discharge point and increasing the volume of allowable water discharges.

The proposed modifications would not require changes to the existing mining fleet, the workforce, underground coal extraction limits or underground mine layouts, or the operational life of the mine.

Moolarben Coal's primary justification for the proposed modifications is to increase the rate of coal recovery and improve the operational efficiency of open cut mining operations across the mine. The proposals also seek to ensure that the predicted on-site water surplus from the approved operations is effectively managed and allows the controlled release of treated water in accordance with the Environment Protection Authority's (EPA's) Environmental Protection Licence (EPL) for the mine.

Under the Minister's delegation of 14 September 2011, the Independent Planning Commission must determine both modification applications as more than 25 objections were received during the exhibition of the Environmental Assessment.

Engagement

The Department publicly exhibited the applications and accompanying Environmental Assessment from 7 November until 7 December 2017. The Department received 69 submissions objecting to the proposals from the community and received advice from 5 government agencies.

The majority of public submissions were from people residing more than 50 km from the mine, while more than 20 public submissions were from people residing between 5 and 50 km of the mine. 29 of the objections were form letter submissions.

None of the government agencies objected to the proposals, although a number of agencies requested additional information and recommended changes to the existing conditions.

The Department also consulted with the Commonwealth Department of the Environment and Energy (DoEE) in relation to the potential biodiversity impacts, and the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) in relation to the water matters relevant to the proposed modifications.

Key Issues

Government agencies requested additional information in regard to the water and biodiversity aspects of the proposed modifications. The key water issues related to the proposed increase in the volume of water discharged from the site and the proposal to store brine in underground workings. The key biodiversity issues relate to the proposal to offset vegetation clearing with a combination of land-based offsets and rehabilitation on the mine site.

Community submissions generally focused on impacts on water resources associated with the proposed increase in discharges from the site, including water quality, aquatic ecology and the potential effects on downstream users along the Goulburn River. Other key issues related to the cumulative impacts of mining in the region, biodiversity impacts, and the arrangements to ensure long-term protection of 'The Drip'.

Assessment

Water Resources

The key issue for the assessment of the proposed modifications is the increase in the proposed discharge to the Goulburn River, and the cumulative impacts of mining on water resources.

Controlled water discharges from the Ulan, Moolarben and Wilpinjong mines are regulated by the respective EPA EPLs. The total daily EPL discharge volume limits are 30 ML/day for Ulan Coal Mine, 10 ML/day for Moolarben Coal Mine, and 5 ML/day for Wilpinjong Coal Mine.

Ulan and Wilpinjong treat their surplus mine water using reverse-osmosis water treatment facilities prior to discharging offsite to meet salinity electrical conductivity (EC) concentration discharge limits of 900 $\mu\text{s}/\text{cm}$ and 500 $\mu\text{s}/\text{cm}$ respectively. At the Moolarben Coal Mine, water is not treated prior to discharging, and the EC limit is also 900 $\mu\text{s}/\text{cm}$.

Historically, the mines have discharged far less than they are permitted to by the EPLs. Ulan has discharged an average of 11 ML/day into the Goulburn River since 2011 and Wilpinjong has discharged around 3.5 ML/day into Wilpinjong Creek since 2016. Apart from a prolonged wet weather event in 2011, no water discharges have been necessary from the Moolarben Coal Mine. This is primarily due to below average rainfall and limited extraction from the approved underground workings.

Moolarben Coal has now updated and re-calibrated the 2011 groundwater model for the mine using the most-up-to-date monitoring data and to reflect previously approved changes to the sequencing and rate of mining

operations. The model predicts that there would be an increase in the annual average groundwater inflow from 1,649 to 2,615 ML a year from the Permian aquifers into the mine.

The predicted increase in groundwater inflow does not relate to any changes associated with the proposed modifications. It is related to updated groundwater modelling, previous changes to the sequence and rate of underground mining, which include a delay to UG4 dewatering operations, and additional inflow from the open cut pit at the nearby Ulan Coal Mine. The increased inflow would result in a surplus of water on the site under certain climatic conditions and operating scenarios, particularly once mining in UG4 commences. The surplus water would be managed in surface storage dams, with excess water treated in a new reverse-osmosis water treatment facility before being discharged to the Goulburn River.

For operational reasons there would be a need to discharge water at a higher rate than the current limit in the EPL of 10 ML/day. Moolarben Coal initially proposed a revised discharge limit of 20 ML/day at 900 $\mu\text{s}/\text{cm}$, which it argued was consistent with the nearby Ulan Coal Mine and would not result in any significant impacts on water quality.

However, from a strategic perspective, the EPA is seeking to reduce salinity loads and improve water quality in the Goulburn and Hunter River catchments to address cumulative impacts on aquatic ecology and maintain the integrity of the Hunter River Salinity Trading Scheme.

The EPA also wants to ensure that the proposed discharge limits more accurately reflect the actual discharges from the mine rather than theoretical maximums. In this regard, over the life of the mine, discharges are predicted to average around 4ML/day and around 11 ML/day during the 5 years of mining in UG4.

Consequently, following further consultation with the Department and the EPA, Moolarben Coal agreed to revise its proposed discharge volumes to the following:

- a discharge limit of 10 ML/day prior to commencing and following the completion of mining in UG4;
- up to 15 ML/day during operations in UG4; and
- temporary higher volume releases during prolonged wet periods.

It has also agreed to treat water discharges to achieve an EC of 685 $\mu\text{s}/\text{cm}$ (reduced from the currently permitted 900 $\mu\text{s}/\text{cm}$) until it commences UG4, and engage an independent expert to undertake a detailed water quality study to derive appropriate long term water quality objectives in accordance with the *Australian & New Zealand Guidelines for Fresh and Marine Water Quality*.

The study would need to be completed by June 2021, and if required, the EPA would be able to vary the EPL for the mine to reflect the outcome of the study prior to the likely increase in discharge volumes associated with UG4.

Both the Department and the EPA consider this outcome is a significant improvement compared with the current situation, and ensures that the water quality objectives in the longer term are informed by sufficient baseline data and are derived in accordance with applicable guidelines.

Increasing the level of mine water discharges would not significantly impact aquatic ecology, channel flow regimes, stability, flooding or downstream water users, as the discharges would be released under controlled conditions. To better measure and assess cumulative flow-related impacts, the Department has recommended that Moolarben Coal be required to establish additional flow monitoring points in the Goulburn River, in consultation with the EPA.

In regard to brine management, most of the brine from the water treatment process would be preferentially managed at the surface by diluting it with stored water and using it for dust suppression across the site. However, a small residual volume of brine is likely to require long term storage in the underground workings.

The Department considers that this would not significantly impact groundwater resources, as the brine would be diluted with the much larger volume of saline groundwater in the surrounding coal seam aquifers.

The Department also considers that underground storage of brine represents the lowest environmental risk as it would avoid the need to build and maintain additional brine storage dams and would eliminate the risk of uncontrolled discharge during extreme climatic events. Nonetheless, the Department has recommended Moolarben Coal be required to prepare a Brine Management Plan in consultation with EPA prior to operating the water treatment facility to ensure appropriate storage and management of brine at the mine.

Biodiversity

In terms of minimising biodiversity impacts, the overall disturbance area associated with the modifications would be reduced by relinquishing areas of native vegetation that were previously approved to be cleared. Residual disturbance resulting from the modifications would be offset by the implementation of a nearby land-based offset known as the Gilgal Property, and through re-establishing woodland communities on the rehabilitated open cut pits or through other mechanisms available under the *Biodiversity Conservation Act 2016*.

Amenity

The modifications would not result in materially increased dust levels to those already approved and the impacts can be managed appropriately under the existing conditions of the approvals. However, the contemporary 2016 standards for PM_{2.5} and PM₁₀ impacts provided in the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, 2016* have been included in the conditions of approval for both stages of the mine. The contemporary standards tighten the regulation of ambient air quality impacts.

The Department's assessment also considered operational noise, rail noise, blasting, Aboriginal cultural heritage, visual, traffic, and socio-economics. In general, the proposed modifications would not significantly increase these impacts, and the existing conditions of the approvals would effectively manage and minimise any residual impacts to achieve an acceptable level of environmental performance.

Summary

The Department considers that any additional impacts that result from the proposed modifications, including cumulative impacts, would be minor. The proposed increased water discharges into the Goulburn River would remain at existing approved volumes for the majority of the remaining mine life and discharge water would be treated to a better quality than existing water quality requirements and in line with ANZECC Guidelines which are designed to protect aquatic ecosystems.

The additional vegetation clearing required for the proposed modifications is relatively small and would be compensated for via a significant land-based offset and other approved mechanisms; and predicted air and noise levels would be similar to the existing approved levels and can be effectively managed under the existing conditions of approvals.

Importantly, the proposed modifications would allow additional benefits of the project to be realised. In this regard, the project would improve the efficiency of resource recovery, which would result in an increase in Government royalties of approximately \$82 million (net present value of approximately \$69 million). Increased production limits would allow annual revenue to increase, would improve the productivity of the mine, and ensure the security and continued employment of the existing workforce and ongoing expenditure in the State and local economies.

Given these benefits can be achieved without resulting in any significant additional adverse impacts on the environment or the local community, the Department considers that the proposed modifications are approvable, subject to the imposition of the recommended conditions of approval.



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1. Introduction

The Moolarben Coal Mine is an open cut and underground coal mining operation about 40 kilometres northeast of Mudgee (see **Figure 1**). The Moolarben Coal Mine, along with neighbouring Ulan Coal Mine and Wilpinjong Coal Mine, forms a large coal mining complex in the Mudgee region.

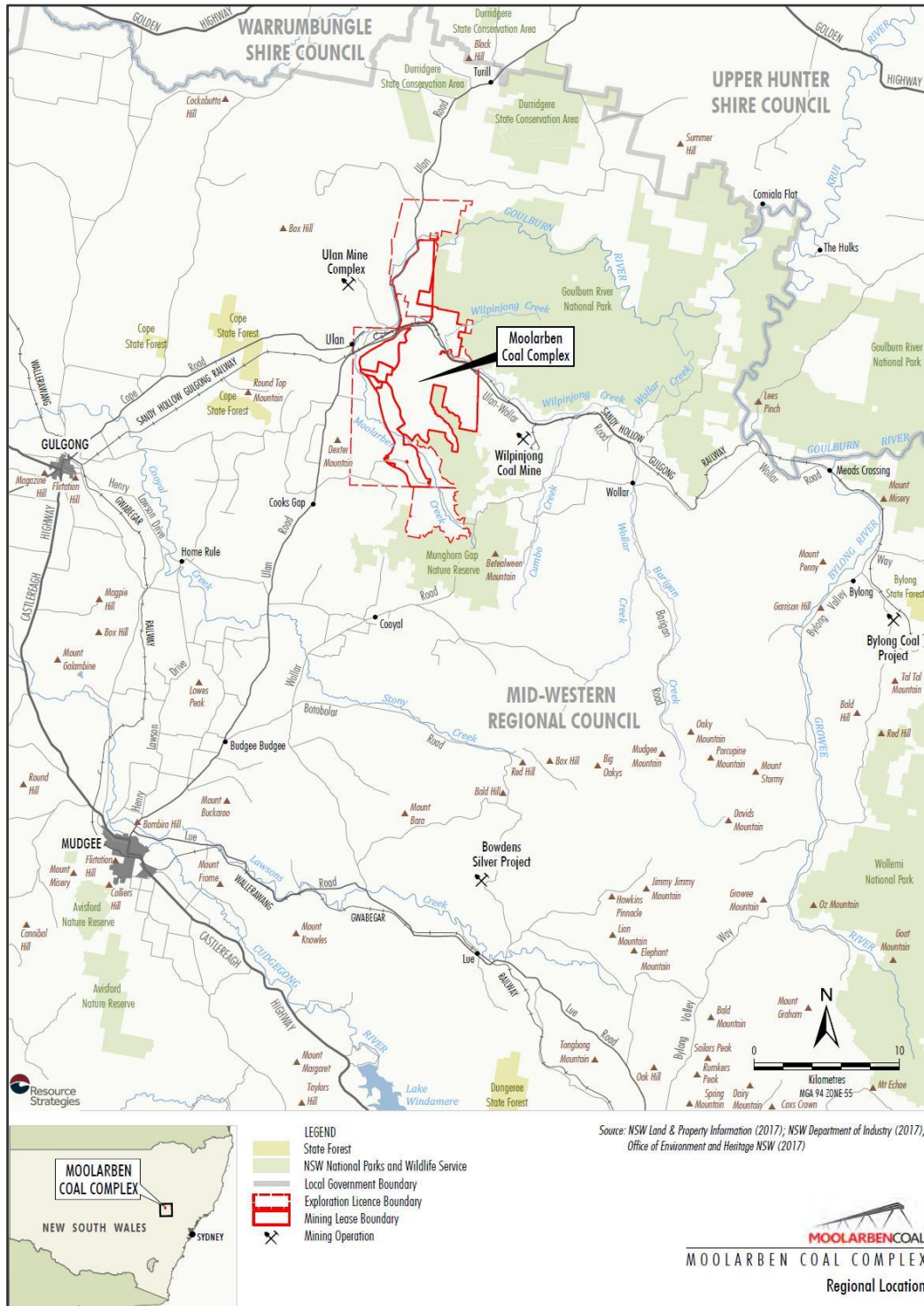


Figure 1 | Site Location

Moolarben Coal Operations Pty Ltd (Moolarben Coal) operates the Moolarben Coal Mine on behalf of the Moolarben Joint Venture (Moolarben Coal Mines Pty Ltd, Sojitz Moolarben Resources Pty Ltd and a consortium of Korean power companies). Moolarben Coal and Moolarben Coal Mines Pty Limited are wholly owned subsidiaries of Yancoal Australia Limited.

Stage 1 Project

The Moolarben Coal Mine Stage 1 Project (05_0117) was approved by the then Minister for Planning on 6 September 2007 under the now repealed Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The decision was made following a detailed review by an Independent Hearing and Assessment Panel at the time.

The Stage 1 approval allows for the development of three open cut pits (named OC1, OC2 and OC3) and an underground mining operation (named UG4). It also allows for a range of surface infrastructure to support mining operations, which includes a coal handling and preparation plant (CHPP) and coal rail transportation facilities. In terms of production, the Stage 1 approval allows for the extraction of up to 8 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal combined from the open cut pits and 8 Mtpa of ROM coal from the underground mine. Coal washing is limited to 13 Mtpa. The Stage 1 project has been modified on 13 occasions under Section 75W of the EP&A Act (see **Table 1**).

Table 1 | Stage 1 Modifications

Mod No.	Subject	Date
Mod 1	Surface infrastructure layout changes	26/11/08
Mod 2	Preliminary construction works	18/12/08
Mod 3	Coal production and transport	30/01/15
Mod 4	Surface infrastructure layout changes	05/10/09
Mod 5	Rail loop re-design	30/06/09
Mod 6	Reject bin capacity	11/01/10
Mod 7	Coal stockpile capacity	27/05/10
Mod 8	Water supply borefield	03/02/11
Mod 9	Open cut optimisation	16/06/14
Mod 10	Open cut production increase	17/04/15
Mod 11	Surface infrastructure layout changes	21/08/15
Mod 12	Underground mining optimisation	29/04/16
Mod 13	Coal washing limit	20/01/17

The general layout of the approved Stage 1 operations is shown in **Figure 2** (see blue outline). To date, Moolarben Coal has constructed the mine's surface infrastructure, and is extracting coal from OC1 and OC2. Mining operations are scheduled to commence at the end of 2018 in OC3 and at UG4 in 2021.

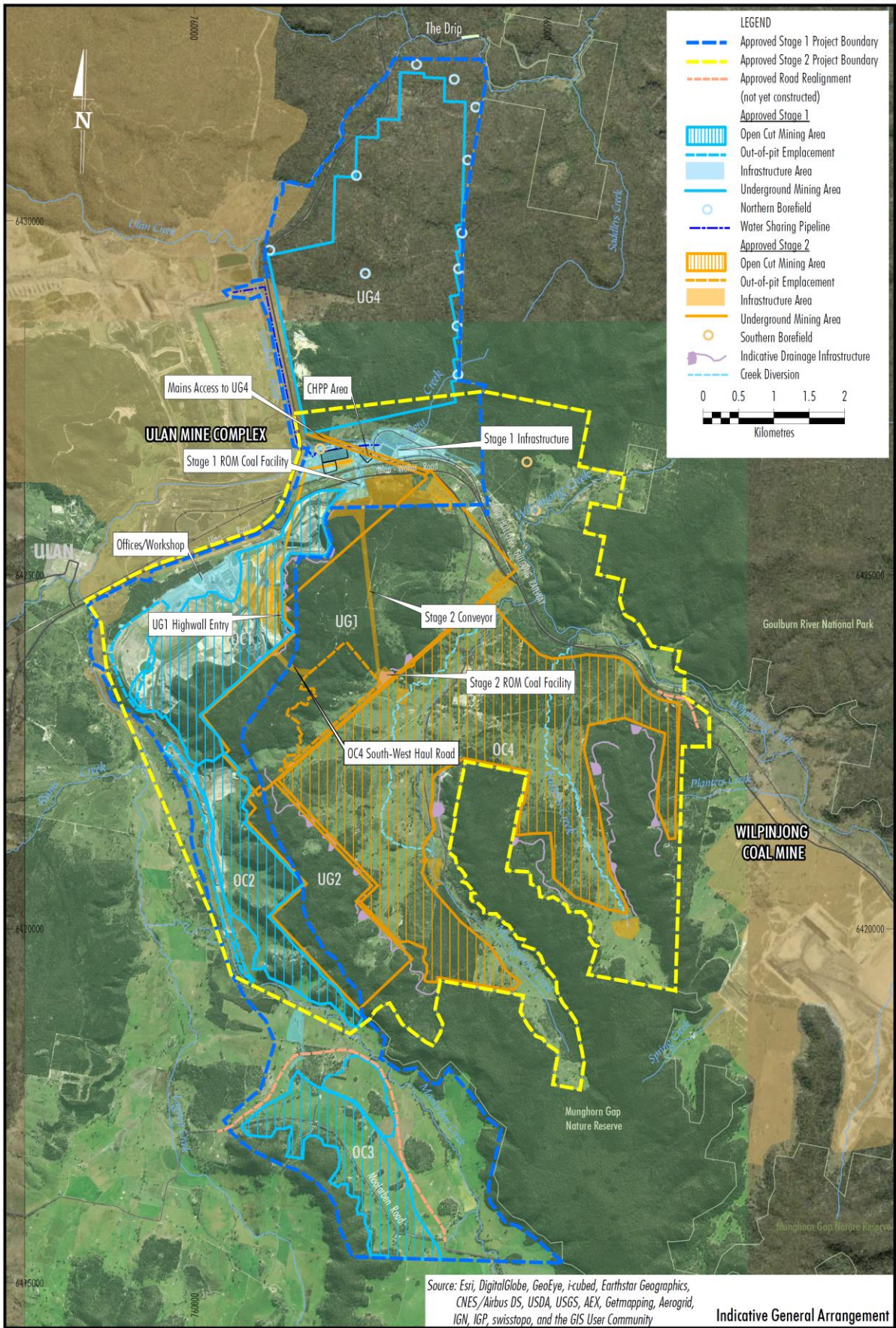


Figure 2 | Approved Moolarben Coal Mine Stage 1 and Stage 2

Stage 2 Project

The Moolarben Coal Mine Stage 2 Project was approved by the former Planning Assessment Commission (the Commission) on 30 January 2015, also under the former Part 3A of the EP&A Act. This project allows for the expansion of mining operations to the east of the Stage 1 operations, and includes the development of a large open cut pit (named OC4) and two underground mining operations (named UG1 and UG2).

Stage 2 is being operated concurrently with Stage 1, and together the two projects share the Stage 1 infrastructure, including the CHPP and rail facilities.

Coal production under the Stage 2 approval is limited to 12 Mtpa of ROM coal from the open cut operation, and 8 Mtpa from the underground operations.

Moolarben Coal has recently commenced mining operations in OC4 and longwall extraction in UG1. Underground mining in UG2 is proposed to commence in 2025.

All coal from the Stage 2 operations is delivered to the Stage 1 surface infrastructure area for processing and despatch by rail. The general layout of the approved Stage 2 operations is shown in **Figure 2** (see yellow outline).

The Stage 2 project approval has been modified twice under Section 75W of the EP&A Act (see **Table 2**).

Table 2 | Stage2 Modifications

Mod No.	Subject	Date
Mod 1	Surface infrastructure layout changes	21/08/15
Mod 2	Underground mining optimisation	29/04/16



2. Proposed Modifications

Moolarben Coal has lodged two concurrent modification applications for the Stage 1 Project (05_0117 MOD 14) and Stage 2 Project (08_0135 MOD 3). The Department is assessing both modification applications together as described in this report.

There are four main components to the proposed modifications, which are described in detail in the Environmental Assessment which accompanied the applications (see **Appendix B**):

1. **Increases in annual ROM coal production and handling limits**

The current combined annual ROM extraction limits from the Moolarben Coal Mine open cut pits is 20 million tonnes per annum (Mtpa). Moolarben Coal has reviewed its site mine planning and has identified that it could optimise its open cut operations and increase the annual extraction volumes with no material change to its existing mine fleet. It is seeking approval to increase the annual extraction limits from the:

- Stage 1 open cut pits from 8 Mtpa to 10 Mtpa; and
- Stage 2 open cut pit from 12 Mtpa to 16 Mtpa.

These proposed extraction increases would require coal processing, handling and transportation limits to also increase, including:

- the amount of coal washed at the CHPP would increase from 13 to 16 Mtpa;
- the handling limit for ROM coal extracted from the combined Stage 1 and Stage 2 open cuts would increase from 13 to 16 Mtpa;
- the handling limit for ROM coal extracted from the combined Stage 1 and Stage 2 open cut pits and the underground mining operations would increase from 21 to 24 Mtpa; and
- the peak daily product coal rail movements would increase from 9 to 11 per day (with an average of 8 train movements per day).

2. **Revisions to Stage 1 open cut pit boundary limits**

Moolarben Coal has identified that it would be able to access additional coal resources outside of the existing boundary limits of the Stage 1 OC2 and OC3 open cut pits. These resources would be able to be mined safely and efficiently, and minor pit extensions would increase the long-term stability of the final landform.

Moolarben Coal is therefore seeking approval to change the OC2 and OC3 pit boundaries.

Overall, the net increase in open cut pit area of the Stage 1 operations would be around 2 hectares (ha), which represents a 0.2% increase when compared to the existing approved open cut pit areas.

The approved OC3 out of pit emplacement area would no longer be required for permanent waste emplacement, and this area would be relinquished from clearing.

The proposed open cut pit revisions are shown in detail in **Figure 3**.

3. **Changes to Stage 1 and Stage 2 surface infrastructure**

Moolarben Coal has identified several changes to the approved Stage 1 and Stage 2 surface infrastructure that would further optimise the efficiency of mining operations. In general terms Moolarben Coal is asking to:

- realign, straighten and widen the approved OC2 to OC3 haul road;

- not develop the approved OC3 out of pit emplacement area, and relocate the OC3 mine infrastructure area to the approved disturbance footprint;
- construct a bypass conveyor system to allow open cut ROM coal to bypass the CHPP and be transferred directly to the product coal stockpile;
- construct an internal access road between OC2 and OC4;
- make minor upgrades to the CHPP;
- increase product coal and construction material stockpiles; and
- upgrade the rail load-out infrastructure to handle the additional coal produced.

The proposed changes to surface infrastructure are shown in detail in **Figure 4**.

4. Water Treatment Facility

An updated groundwater model has been completed for the Moolarben Coal Mine using the latest modelling technology, which predicts increased groundwater inflow compared to that forecast in the model developed for the mine in 2011.

The increased groundwater inflow volume predictions are primarily related to approved changes to the sequencing and rate of mining operations that were considered in Stage 1 Mod 12 and Stage 2 Mod 2. Updated water balance modelling also indicates that the increased inflow would result in the mine being a surplus water site in some years under certain climatic conditions and operating scenarios.

To manage the predicted on-site water surpluses and to support the controlled release of water under the EPL release conditions, Moolarben Coal is seeking approval to:

- install and operate a reverse osmosis water treatment facility and associated treated water storages adjacent to the existing rail loop area;
- treat all water to reduce its salinity and metals concentrations before discharging;
- stage its water discharge limits to 10 ML/day until the end of 2021 and following completion of mining in UG4, 15 ML/day during mining in UG4, and more than 15 ML/day during prolonged wet periods (but only with the approval of the Environment Protection Authority (EPA)); and
- relocate the existing EPL discharge point at Bora Creek to a stable rock platform at the confluence of Bora Creek and the Goulburn River Diversion.

The proposed location and indicative layout of the water treatment facility is shown in detail in **Figure 5**.

The water treatment process would generate a brine by-product, which Moolarben Coal is seeking approval to manage by storing it at the surface, diluting it with mine water and using it for dust suppression on site. It is also seeking approval for residual brine not able to be stored at the surface to be permanently stored in the dewatered coal seam aquifer in UG4.

The above modifications would not require changes to the existing mine fleet, the workforce, underground coal mining extraction limits or underground mine layouts, or the operational life of the mine.

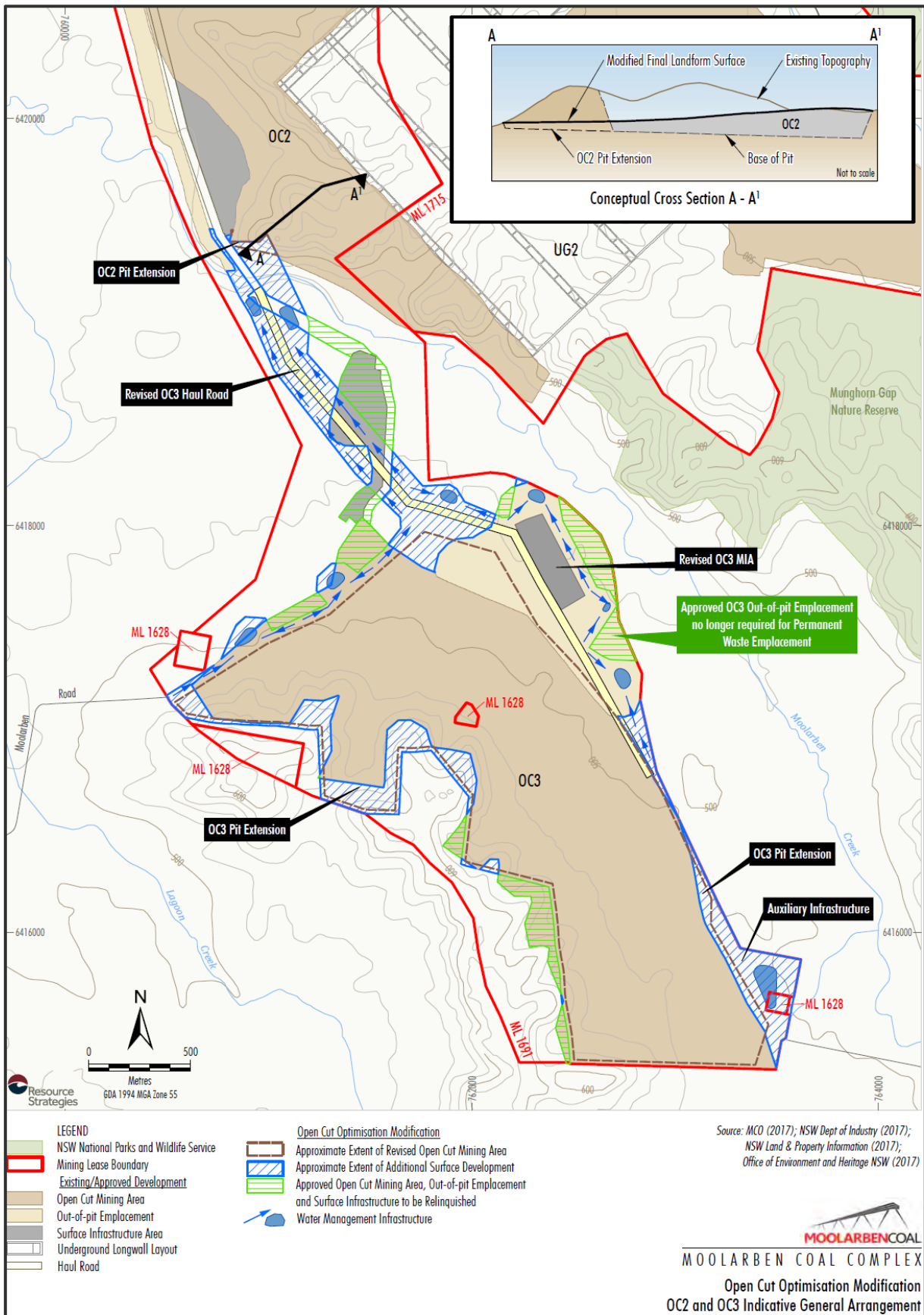


Figure 3 | Proposed changes to open cut operations

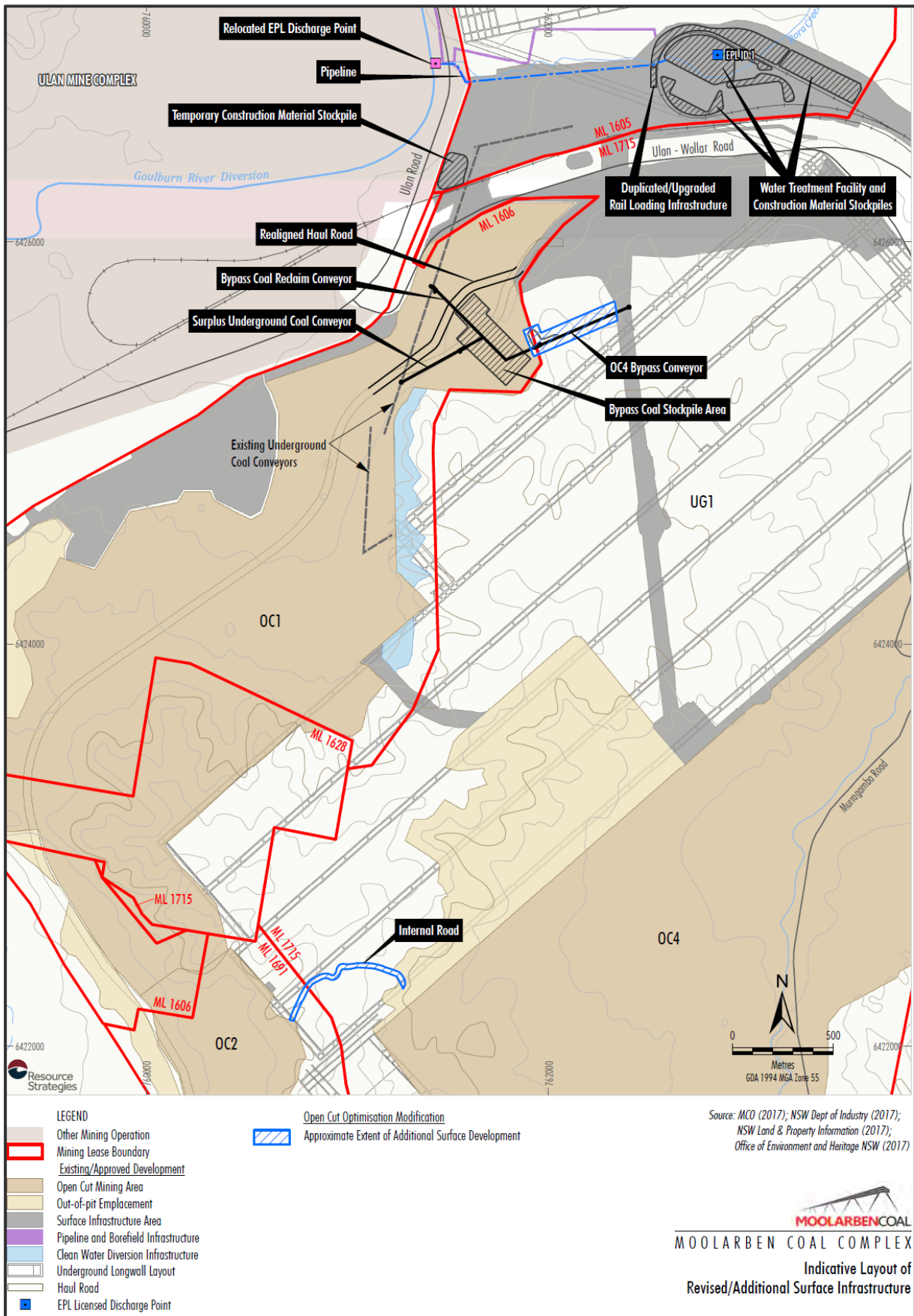


Figure 4 | Proposed changes to surface infrastructure

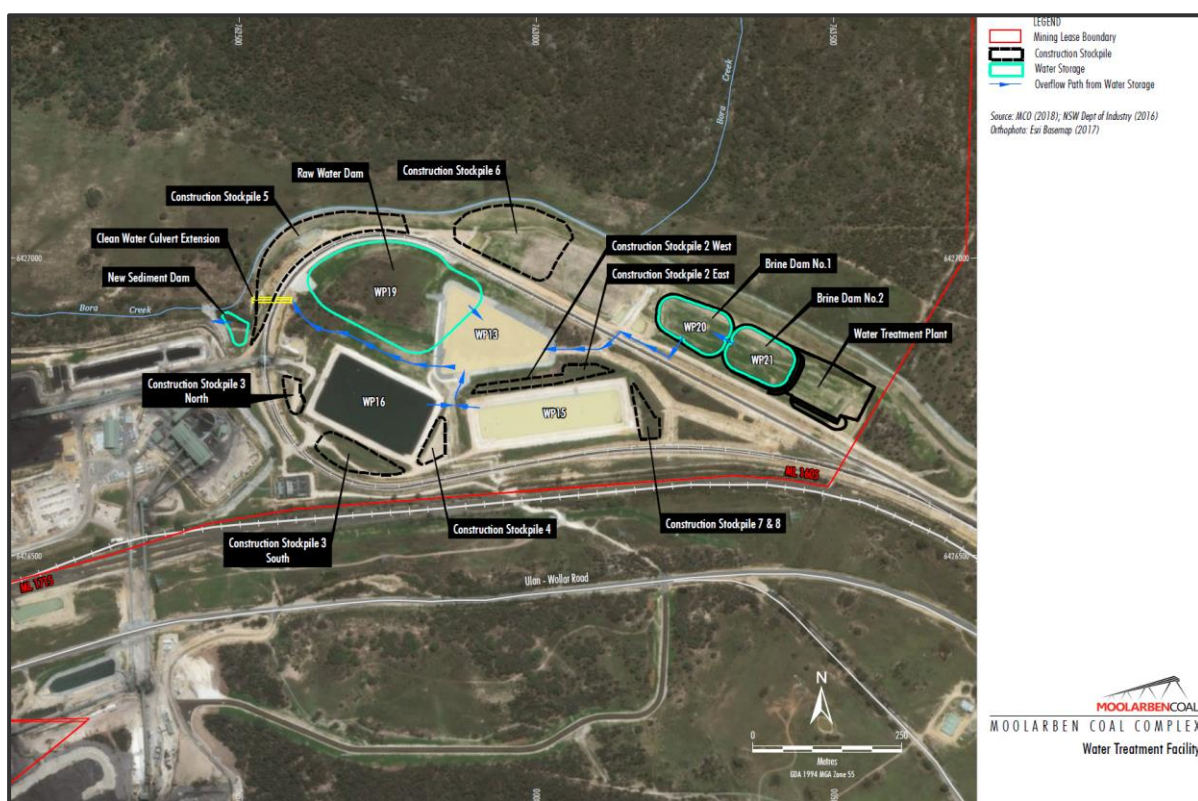


Figure 5 | Indicative Water Treatment Facility layout

A summary of the modifications and how they relate to the existing Stage 1 and Stage 2 approvals is provided in **Table 3** and shown in **Figure 6**.

Table 3: Proposed modifications and relationship to existing project approvals

Component	Stage 1	Stage 2
ROM Coal Production		
Increase in annual ROM coal production from OC1, OC2 and OC3 pits from 8 to 10 Mtpa	Modification 14	
Increase in annual ROM coal production from OC4 pit from 12 to 16 Mtpa		Modification 3
Increase in combined annual open cut ROM coal limit from 13 to 16 Mtpa	Modification 14	Modification 3
Increase in annual coal processing limit from 13 to 16 Mtpa	Modification 14	Modification 3
Increase in the annual combined open cut and underground ROM coal production limit from 21 to 24 Mtpa	Modification 14	Modification 3
Increase in the annual product coal limit from 18 to 22 Mtpa	Modification 14	Modification 3
Increase in product coal rail movements (one additional train per day on average and two additional trains per day at peak)	Modification 14	
Increase in the annual rate of coal reject production	Modification 14	Modification 3
Open Cut Pit Boundaries		
Minor increase to the pit limit in the south-west of OC2	Modification 14	
Straighten the western pit limits of OC3, resulting in both minor extensions and reductions in pit limits	Modification 14	
Minor increase to the northern and eastern pit limits of OC3	Modification 14	

Component	Stage 1	Stage 2
Surface Infrastructure		
Relocate the OC3 mine infrastructure area to within the approved disturbance footprint of the OC3 out-of-pit emplacement (no longer required)	Modification 14	
Revise alignment and widen the haul road from OC2 to OC3	Modification 14	
New internal road from OC2 to OC4 to allow for the occasional transfer of mining equipment	Modification 14	Modification 3
New bypass conveyor to enable coal of suitable quality from the open cuts to be bypassed	Modification 14	Modification 3
Add a thickener and extra belt press filters to the coal handling and preparation plant	Modification 14	
Additional ROM coal stockpiles at OC3 (for open cut and underground bypass coal), relocate the OC4 ROM coal facilities and increase the size of product coal stockpiles	Modification 14	Modification 3
Upgrade the train loadout infrastructure (including conveyor and bin upgrades)	Modification 14	
Stockpile the material excavated during construction activities for use in final landform shaping and rehabilitation	Modification 14	
Water Management		
Install and use a water treatment facility and associated water storages adjacent to the existing rail loop area to provide water for on-site use to treat up to 20 ML/day of water	Modification 14	
Controlled release of up to 10 ML/day until the end of 2021 and following operations in UG4, up to 15 ML/day during UG4 operations and greater than 15 ML/day during prolonged rainfall events	Modification 14	
Construct pipelines from the water treatment facility to a relocated EPL discharge point at the confluence of Bora Creek and the Goulburn River Diversion	Modification 14	

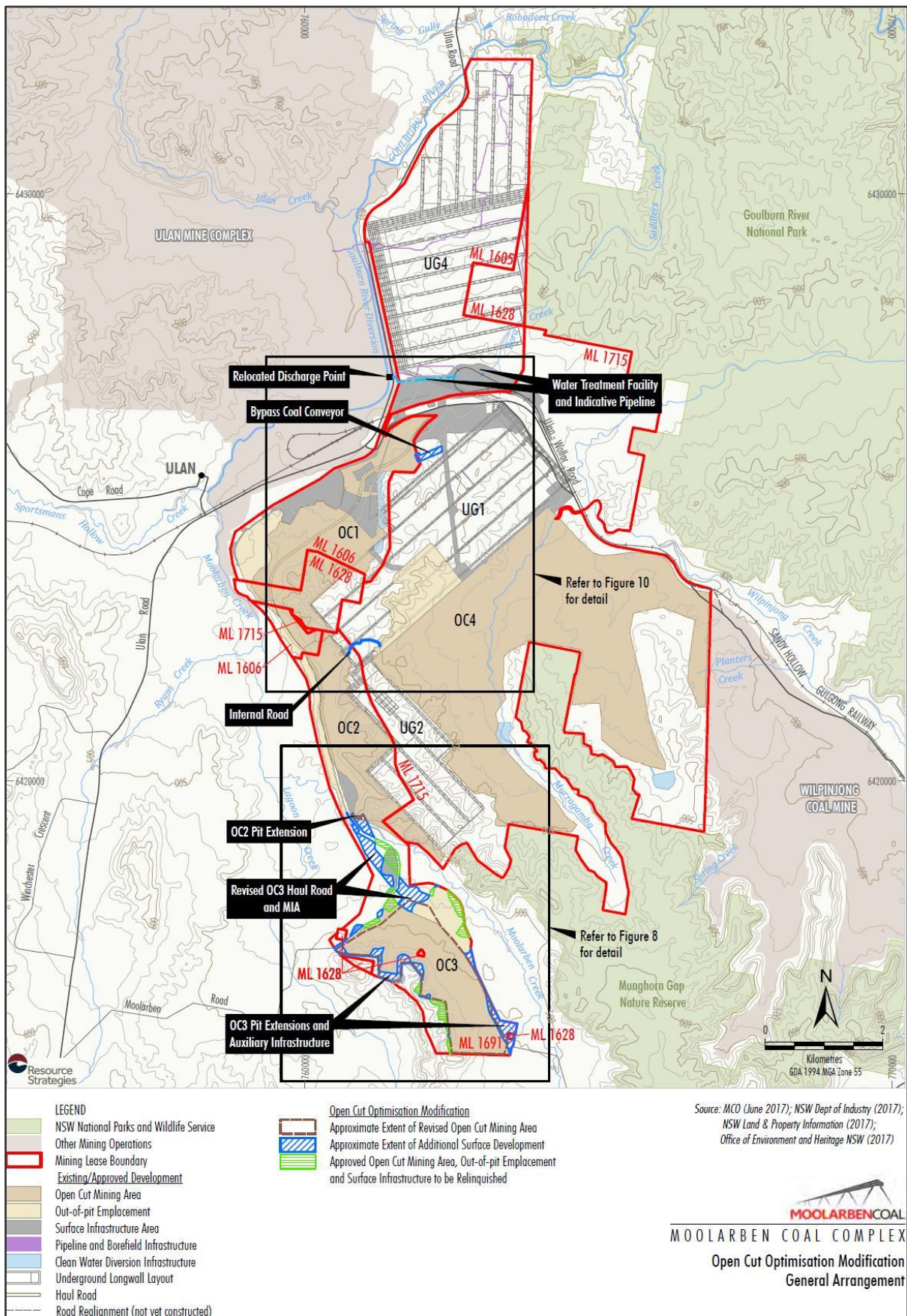


Figure 6 | Key components of the proposed modifications



3. Strategic Context

3.1 Regional Water Management

The Moolarben Coal Mine and the neighbouring Ulan Coal Mine and Wilpinjong Coal Mine form a large coal mining complex in the Mudgee region. The mines have approval to extract a combined total of up to 57 Mt of ROM coal a year, process the coal at existing CHPPs at the mines, and export product coal to domestic and export markets via the Gulgong to Sandy Hollow Railway line. This mining complex is now one of the most significant outside of the Hunter Valley.

The mining complex is predominantly located in the upper reaches of the Goulburn River catchment, which drains east and eventually joins the Hunter River. In 1981, the upper reaches of the Goulburn River were diverted for 3.6 km, adjacent to and downstream of the Ulan Coal Mine (see **Figure 7**). The Goulburn River Diversion channel was constructed to allow the development of the East Pit at the Ulan Coal Mine. The diversion is 10-20 metres deep and cut into bedrock, although there is now a well-established thick reed bed and other riparian vegetation in the bed of the diversion.

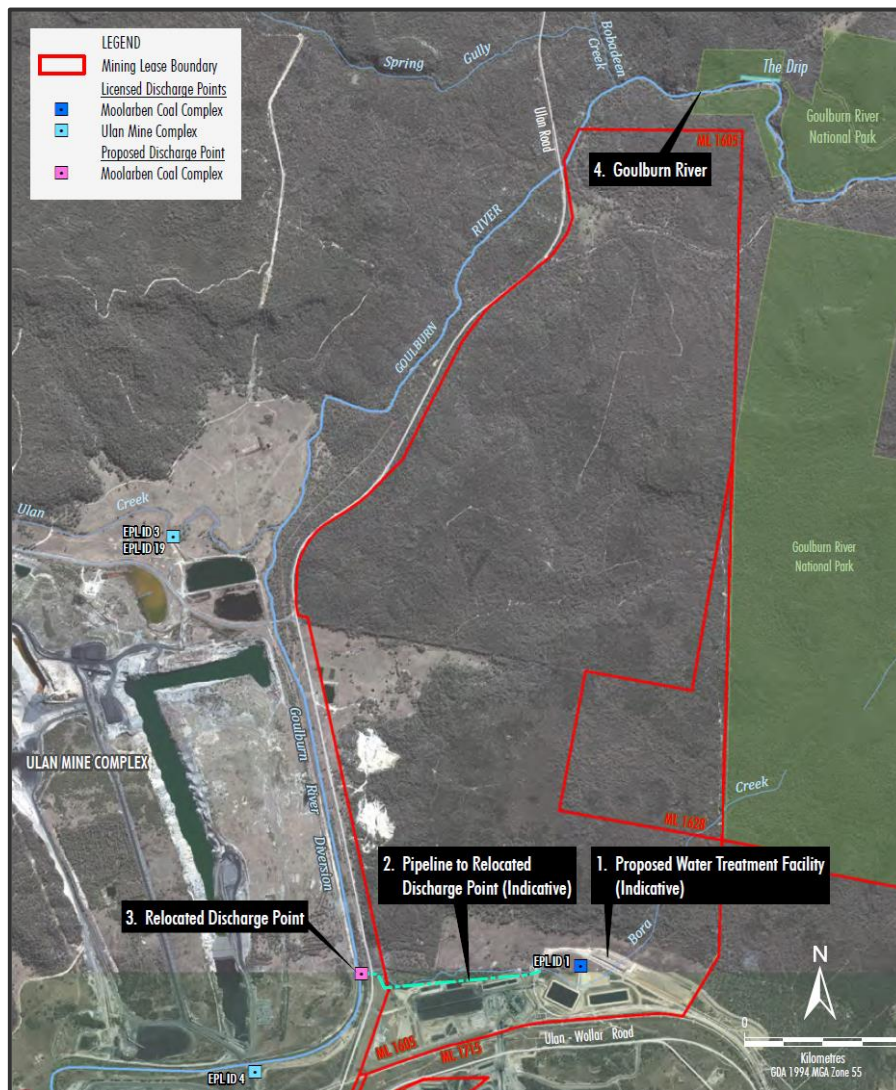


Figure 7 | Location of the Goulburn River Diversion and The Drip

The mines strategically manage water at their respective sites. Water extracted from workings and otherwise captured on site is preferentially used for coal washing and dust suppression. Water in excess of these needs is stored in on-site dams. Surplus water can be discharged from the mines to the Goulburn River. Controlled discharges are regulated by the respective EPLs for the mines. The total daily EPL discharge volume limits are 30 ML/day for Ulan Coal Mine, 10 ML/day for Moolarben Coal Mine, and 5 ML/day for Wilpinjong Coal Mine.

Ulan and Wilpinjong treat their surplus mine water using reverse-osmosis water treatment facilities prior to discharging offsite to meet salinity electrical conductivity (EC) concentration discharge limits of 900 $\mu\text{s}/\text{cm}$ and 500 $\mu\text{s}/\text{cm}$ respectively. At the Moolarben Coal Mine, water is not treated prior to discharging. The EC limit set in its EPL is also 900 $\mu\text{s}/\text{cm}$.

Historically, the mines have discharged far less than they are permitted to by the EPLs. Ulan has discharged an average of 11 ML/day since 2011 and Wilpinjong has discharged around 3.5 ML/day since 2016. No water discharges have been necessary from the Moolarben Coal Mine since 2011. However, in 2011 a significant prolonged rainfall event resulted in the Mudgee area being declared a natural disaster area. During this event, the EPA approved emergency discharge provisions to avoid the sites becoming flooded and to maintain safe working conditions.

It is important to note that, under the changes associated with the proposed modifications, for the majority of the remaining mine life of the Moolarben Coal Mine, the approved 10 ML/day discharge volume limit would not change, and the EC concentration limit would be significantly reduced from current levels (ie from 900 $\mu\text{s}/\text{cm}$ to 685 $\mu\text{s}/\text{cm}$ or less).

3.2 'The Drip'

A locally recognised important cliff seepage feature known as 'The Drip' is located on the Goulburn River about 13.5 km north of the proposed open cut pit extension areas. In recognition of the importance of this feature to the local community, Moolarben Coal committed to ensuring the long-term protection of the area containing 'The Drip'.

In March 2015, Moolarben Coal transferred the land to the Minister for the Environment. In February 2018, the Office of Environment and Heritage (OEH) on behalf of the Minister subsequently lodged subdivision plans for the area and has confirmed that it will lodge a plan to register the area as a State Conservation Area (SCA) when the subdivision plans are approved by the NSW Lands & Registry Service.



4. Statutory Context

4.1 Scope of Modifications

The Stage 1 and Stage 2 projects were approved under the former Part 3A of the EP&A Act. Although Part 3A was repealed on 11 October 2011, the projects remain 'transitional Part 3A projects'. Under the current savings provisions, they are able to be modified under the former Section 75W of the EP&A Act.

The Department considers that the current proposed modifications can be characterised as modifications to the current project approvals, as:

- there would be limited change to the physical extent of the approved mining operations;
- there would be no material change to the existing mining fleet;
- there would be no change to the hours of operation or operational mine life;
- there would be no change to the underground coal extraction limits or mine layouts;
- the changes to the existing surface infrastructure would be relatively minor; and
- although open cut coal production rates would increase, this increase would not significantly increase the environmental impacts of the Stage 1 and Stage 2 projects beyond that which has already been assessed and approved (refer to Section 5).

Consequently, the Department considers the proposed modifications to be within the scope of Section 75W of the EP&A Act.

4.2 Approval Authority

The Minister for Planning is the approval authority for the modification applications. However, under the Minister's delegation of 14 September 2011, the Independent Planning Commission must determine both modification applications. This is because the Department received more than 25 public submissions by way of objection to the modification applications.

4.3 Commonwealth Approvals

On 24 August 2017, a delegate for the Commonwealth Minister of the Environment determined the project (EPBC 2017/8121) to be a 'controlled action' in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to likely significant impacts to listed threatened species and communities (Sections 18 and 18A) and a water resource, in relation to coal seam gas development and large coal mining development (section 240 & 24E).

The assessment process under the EP&A Act has been accredited under a bilateral agreement with the Commonwealth Government. Accordingly, the NSW Government has undertaken the assessment on behalf of the Commonwealth and has assessed the potential impacts on the relevant matters of national environmental significance (MNES) (see Section 6 and Appendix H).

The proposed modifications were jointly referred by the Department and the Department of Environment and Energy (DoEE) to the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC) for advice on surface and groundwater impacts, as well as potential impacts on downstream watercourses and receiving environments. The IESC's advice is summarised in Section 5 and has been considered in detail in Section 6.



5. Engagement

5.1 Department’s Engagement

After receiving the modification applications, the Department:

- exhibited the applications and EA from 7 November 2017 until 7 December 2017 at ServiceNSW Centres, at Mid-Western Regional Council and at the Nature Conservation Council;
- made the documents available on the Department’s website on 7 November 2017;
- visited the Moolarben Coal Mine with government agencies on 29 November 2017; and
- met with:
 - EPA, OEH and Moolarben Coal on 10 April 2017;
 - EPA, Moolarben Coal and Ulan Coal on 26 June 2018; and
 - EPA and Moolarben Coal on 13 July 2018.

5.2 Summary of Submissions

During the exhibition period, the Department received 69 public submissions, including 11 submissions from 10 special interest groups and 58 submissions from the general public, and advice from 5 government agencies (see summary in **Table 4** and **Appendix C**).

All of the special interest groups and general public submissions objected to the proposed modifications. Of the 58 submissions received from the general public, 29 were form letter submissions. Of the total received, 28 were from the Mid-Western Region Local Government Area, 2 submissions were made by people living within 5 km of the mine, and most of the other objections were from people living 50 kilometres or more from the mine.

Table 4 | Summary of Agency Advice and Public Submitters

Agency Advice and Public Submitters	Number	Position
Agencies	5	Advice
<ul style="list-style-type: none"> • Environment Protection Authority • Department of Industry - Crown Lands and Water Division • Division of Resources and Geosciences • Office of Environment and Heritage • Mid-Western Regional Council 		
Special Interest groups	11	All objection
<ul style="list-style-type: none"> • Bathurst Community Climate Action Network • Central West Environment Council • Environmentally Concerned Citizens of Orange • Hunter Communities Network • Hunter Environment Lobby • Mudgee District Environment Group • Orange Field Naturalist & Conservation Society • Running Stream Water Users Association • Ryde Hunters Hill Flora Preservation Society (2 submissions) • Wollar Progress Association 		
Community	58	All objections

Agency Advice and Public Submitters	Number	Position
Approx. distance from Moolarben mine complex:		
• <5 km	2	
• 5 - 50 km	22	
• >50 km	34	
TOTAL	74	69 Objections

5.3 Key Issues – Government Agencies

None of the agencies objected to the proposed modifications. However, all commented on particular aspects of the proposals and recommended changes to the existing conditions. These comments and recommendations are summarised below and considered in more detail in Section 6 of the report.

Environment Protection Authority (EPA) sought an explanation for the air quality modelling assumptions used in the assessment, including justification for the assessment approach taken for PM_{2.5} emissions. The EPA also requested more detailed information regarding the effectiveness of the predictive and reactive air quality management system. These matters were clarified during the assessment process. and the EPA asked that Moolarben Coal installs a real-time PM_{2.5} monitor. These issues are considered further in Section 6.7.

EPA also sought further justification for the proposed increase in water discharge volume. It requested additional information to avoid and mitigate the impacts of increased discharge volumes to the Goulburn River, particularly in relation to downstream salinity impacts. Following further consultation with the EPA and the Department, Moolarben Coal has now proposed to stage its discharge volume increase and significantly reduce the salinity of these discharges.

The EPA also requested additional information in relation to brine management practices, which Moolarben Coal provided during the assessment process. The EPA subsequently recommended a condition requiring the preparation of Brine Management Plan, and the Department has included a condition requiring preparation of the plan (see Section 6.4).

In relation to noise, EPA asked for further information about inputs to the noise assessment and clarification in relation to the assessment of low frequency noise. The EPA stated that the proposals include additional feasible and reasonable mitigation to achieve the predicted noise levels, and that it could support the modifications with no changes to the existing noise limits in the EPL.

Department of Industry – Water Division (Dol Water) sought clarification of the potential impacts of the modifications on baseflow and the unconsolidated paleochannel near UG1. These clarifications were provided by Moolarben Coal during the assessment process.

Dol Water also recommended that the groundwater monitoring program is expanded to include areas down gradient from the proposed pit extensions. Moolarben Coal has committed to expanding the groundwater network by installing an additional groundwater monitoring bore adjacent to OC3 in the vicinity of Moolarben Creek. The additional monitoring bore would be documented in the Water Management Plan, which would be updated for the proposed modifications. These issues are considered in Section 6.1.

Office of Environment and Heritage (OEH) sought further justification about mechanisms to compensate the residual biodiversity credit liability resulting from the modifications. Moolarben Coal provided further information during the assessment process on this issue. OEH considers that the Framework for Biodiversity Assessment (FBA) Credit Calculator for Major Projects and BioBanking has been appropriately applied to confirm that the vegetation associated with the relinquishment areas is equivalent and compares to the proposed disturbance areas.

OEH has also reviewed and accepted the figures presented in the Biobanking Assessment Report and has recommended a condition of approval to ensure the proposed biodiversity offset site is secured in perpetuity, which has been adopted in the recommended conditions (see Section 6.6).

Division of Resources and Geoscience (DRG) supports the proposed modifications based on the efficient use of the coal resource. It requested that Moolarben Coal consult with the holders of exploration licences which are located over the proposed Gilgal Property biodiversity offset area, to establish the potential effect on current or future extraction of mineral resources. Moolarben Coal consulted with titleholders, who confirmed that they have no objections to the inclusion of the Gilgal Property as a Biodiversity Offset.

DRG also provided comment on the significance of the resource that would be extracted, stating that the proposed modifications would adequately recover the resource and provide an appropriate return to the State.

Mid-Western Regional Council (Council) did not object to the proposed modifications, but requested that it is consulted during the design and installation of the water treatment facility pipeline to ensure that Ulan Road is protected and maintained. Council also requested that the existing noise and air quality monitoring requirements continue to be incorporated in the project approval for the proposed modifications.

5.4 Key Issues – Special Interest Groups and Community

Of the 69 public submissions, 11 were from special interest groups and 58 were from the general public. The key issues raised in these community submissions related to:

- hydrologic and water quality impacts on the Goulburn River from increased water discharges;
- cumulative social and environmental impacts of the three mines operating in the region;
- additional vegetation clearing; and
- ‘The Drip’ Agreement.

The Department has summarised the issues raised in these submissions in **Table 5** and has considered these issues further in **Section 6**.

Table 5: Summary of issues in Special Interest Group and Community submissions

Issue
<p>Water</p> <ul style="list-style-type: none"> • justification for increased licenced water discharges into the Goulburn River • water quality and ecology impacts and impacts to the Goulburn River downstream of the site • potential increased salt load on the Hunter River Salinity Trading Scheme • flooding impacts • ongoing impact of longwall mining and subsidence on groundwater dependent ecosystems (GDEs), including springs and soaks • incremental impacts on Moolarben Creek • concerns about the water balance, inflow predictions and groundwater modelling • the health and amenity of “The Drip”
<p>Brine Management</p> <ul style="list-style-type: none"> • disposal methods for brine into the underground workings and concerns about using brine for dust suppression
<p>Biodiversity</p> <ul style="list-style-type: none"> • adequacy of the biodiversity assessment • impacts to endangered communities and threatened species loss of hollow bearing trees and cliff line features • success of vegetation re-establishment post-mining • finalisation of the biodiversity offset strategy
<p>“The Drip” Agreement</p> <ul style="list-style-type: none"> • “The Drip” Agreement has not been finalised within the agreed timeframe • the Agreement must be finalised before any further consideration of mine expansion

Issue

Air Quality and Greenhouse Gas

- additional dust from more coal extraction and additional train movements
- adverse impacts of increased carbon emissions caused by increased coal production
- the full cost of climate change impacts has not been assessed

Noise

- additional noise impacts from more coal extraction and additional train movements

Aboriginal Cultural Heritage

- additional disturbance of Aboriginal heritage sites

Train movements

- impacts of increased train movements on the Gulgong to Sandy Hollow Rail Line
- the potential increased waiting time at rail crossings
- additional dust and noise impacts and bushfire incidents from trains
- incidents of coal wagons being uncovered

Final Void

- permanent water sinks, such as final voids, should not be left in the landscape

Socio-economic

- the proposed modifications would not increase jobs or job security
- compliance with noise and air quality limits is only achieved through ongoing purchase of properties

Cumulative impacts

- cumulative impact of three major mining operations on the long-term health and viability of the Goulburn River
- an independent regional water study of the cumulative impacts of mining on the Goulburn River should be undertaken
- cumulative impacts of land disturbance
- cumulative social impacts of ongoing mine expansion
- detrimental impact on rural communities and their social function caused by the ongoing purchase of private property by mining companies

- **Compliance**

- Moolarben Coal has a poor record of environmental management which provides no assurance that the mine can be operated within conditions of approval

5.5 Response to Submissions and Additional Information

In May 2018, Moolarben Coal provided a detailed response to the issues raised in submissions and agency advice (see **Appendix D**).

Following further consultation with the EPA and the Department, Moolarben Coal also provided a range of additional information to support the proposed changes to the proposed controlled release volumes and EC limits.

The Response to Submissions was forwarded to agencies that made submissions. The EPA, OEHL and DoI Water provided supplementary advice (see **Appendix E**), with additional information provided by Moolarben Coal in response to these requests (see **Appendix F**).

The Department has considered these responses in its assessment of the merits of the proposals.

5.6 IESC Advice

As the proposed modifications are controlled actions under the EPBC Act, the Department asked the IESC for advice on the acceptability of risks to surface water resources from the proposed additional water discharges into the Goulburn River. A copy of the advice received from the IESC is provided in **Appendix G**.

A summary of the advice received from the IESC and the sections of this report where the relevant issues are considered is provided in **Table 6** below.

Table 6: Summary of IESC Advice

Issue	Key Advice	Section
Impact Assessment	Provide an improved geomorphological and ecological impact assessment of the likely increase in mine water discharge into the Goulburn River.	Section 6.3
Cumulative Impacts	Provide a detailed consideration of cumulative impacts in the Goulburn River.	Section 6.3
Water Balance Model	Provide a sensitivity analysis of the various inputs in the water balance model.	Section 6.2
Water Quality	<p>Assess whether the action will cause an increase in dissolved metals entering the Goulburn River.</p> <p>Develop water quality objectives and trigger levels for a greater range of contaminants downstream of the discharge point.</p> <p>Provide a water quality monitoring program for treated water.</p> <p>Update the Surface Water Management Plan to include a Trigger Action Response Plan (TARP) to support an adaptive management approach and prevent 'trigger events' from reoccurring.</p> <p>Work with operators of the neighbouring Ulan and Wilpinjong coal mines to install a flow and water quality monitoring point on the Goulburn River.</p>	Section 6.3
Brine Management	<p>Assess the risk of brine stored in underground mine voids or temporary storage options leaching into groundwater.</p> <p>Develop a plan that identifies management measures to address the potential risks associated with brine storage, re-use (blending with mine water) and long-term disposal.</p>	Section 6.4



6. Assessment

6.1 Groundwater

Groundwater Model

Moolarben Coal engaged HydroSimulations to update and re-calibrate the groundwater model for the mine and prepare a groundwater assessment for the proposed modifications. The updated model took into consideration the assumptions made in the 2011 groundwater model, the incremental modelling assessment undertaken for the 2016 Stage 1 Mod 12 and Stage 2 Mod 2 optimisation modifications, as well as data collected at the site and surrounds since 2005.

Increased groundwater inflow is predicted compared to the site groundwater model prepared in 2011. The new model now predicts an average annual groundwater inflow of 2,615 ML/year, where the 2011 model predicted 1,649 ML/year. The increased groundwater inflow volume predictions are the key driver for the request by Moolarben Coal to increase the total treated discharge volumes from the mine.

Concerns were raised in submissions about differences in predictions between the current groundwater model and the previous model. The differences in predictions result from a range of updated inputs.

First, the model has been revised and recalibrated using current and historic groundwater observations (including data from Ulan and Wilpinjong mines), and the observed drawdown from current mining and inflow to UG1.

Secondly, the model considered the predictions made for the previous optimisation modifications (Stage 1 Mod 12 and Stage 2 Mod 2), which dealt with changes to the sequence of approved underground mining, an increased underground mining rate, and delayed dewatering of UG4.

Thirdly, the model considered the potential recharge to down-dip workings from the Ulan East Pit at the Ulan Coal Mine.

The updated groundwater model inputs are based on the most up-to-date information available, including many years of groundwater monitoring data from existing mining operations in the region. The model calibration statistics are better than the Australian Groundwater Modelling Guideline values for acceptable model calibration¹

Change in Impact

Potential changes to groundwater impacts associated with the modifications would be limited, as the modifications involve only minor changes to the approved OC2 and OC3 pit limits and increases to the open cut mining extraction rate. In terms of the daily inflow rate, the model predicts a marginal reduction (ie 0.1 ML/day or 0.05%) compared to the existing approved operations.

While the modifications could result in changes to the timing of local drawdown effects, because mining in OC3 would occur earlier in the mine life and OC4 would be mined at an accelerated rate, this would not materially affect the resulting changes to drawdown of the water table in the Ulan coal seam. Potential impacts to private borewater users, GDEs and baseflows to watercourses and drainage lines would be negligible in comparison to the impacts on these features that were previously assessed and approved.

¹ 4.6% scale root mean square, compared to the guideline value of 5-10% in the groundwater modelling guideline values as presented by the Murray-Darling Basin Commission, 2001 and Barnett et al., 2012.

This conclusion is supported by the IESC's advice, which stated "*the proposed action [modifications] is adjacent to, and mostly up-dip of, already-approved open-cut operations which means that there is unlikely to be substantial additional aquifer depressurisation as a result of the action*"².

Water Entitlements

In terms of groundwater licensing requirements, the changes in the timing of increased inflow means that Moolarben Coal would need to secure its necessary groundwater entitlements earlier in the mine life than previously anticipated. The Department considers that the existing conditions of approval³ for both stages of the project, which require Moolarben Coal to hold sufficient entitlements to account for predicted water take for the life of the mine, remain appropriate to ensure groundwater licences would be secured prior to groundwater take associated with the modifications.

Groundwater Monitoring

Dol Water recommended that the Moolarben Creek alluvium and the isolated paleochannel down gradient from the proposed pit extensions is suitably monitored for impacts. Moolarben Coal has committed to expanding its groundwater monitoring network to include an additional bore adjacent to OC3 near Moolarben Creek. The location of the additional monitoring bore would be finalised and documented in the Groundwater Monitoring Program of the Water Management Plan, which is required to be updated for the proposed modifications within three months of determination of the modification applications, and in consultation with EPA and Dol Water.

6.2 Water Balance

Water Balance Modelling

Moolarben Coal engaged WRM Water & Environment (WRM) to develop a new water balance model for the mine, which incorporates the effect of the modifications and evaluated the implications of the increased groundwater inflow on controlled release requirements. The new water balance model predicts that the mine would be a surplus water site under certain climatic conditions and operating scenarios. Over the 21 year mine life, predicted surpluses are between:

- 11-20 ML/day during very wet climatic conditions (1%ile);
- 0-11 ML/day during median climatic conditions (50%ile); and
- 0-8 ML/day during dry climatic conditions (99%ile).

The highest surpluses across all climatic conditions are predicted between 2021 to 2026 when mining operations are occurring simultaneously in OC4 and UG4 and where high groundwater inflow to UG4 is predicted. The surplus is predicted to peak in 2026 at 20 ML/day during very wet climatic conditions and 11 ML/day during median climatic conditions. After 2026, and until the end of the mine life, the surplus is predicted to be significantly less (ie between 0 ML/day and 2.8 ML/day under median conditions).

Under dry to very dry climatic conditions between 2032 to 2038 the model shows that the mine would need to import water from external sources. The existing Moolarben - Ulan Water Sharing Agreement would be used to cover the deficit as required.

The sensitivity analysis undertaken for the water balance indicates climatic variability has the largest impact on the performance of the water management system. Other inputs that have the most material impact on the site water balance are rainfall runoff characteristics and groundwater inflow.

² Page 2 of Advice to decision maker on coal mining project - IESC 2017-092: Moolarben Coal Project – Optimisation Modifications (EPBC 2017/7974)– Expansion (

³ Condition 29, Schedule 3 of Project Approval 05_0117 (Stage 1) and Condition 25, Schedule 3 of Project Approval 08_0135 (Stage 2).

Justification for the initially proposed 10 ML/day increase in the licenced discharge limits was a key issue raised in community submissions. While the EPA considered that Moolarben Coal was taking a conservative approach to allow it to have a flexible water management system, it also requested further justification for using the 1%ile volumes rather than the 50%ile volumes, as it considered that the 50%ile volumes would be a more accurate indicator of the required discharge volume.

Moolarben Coal provided further information on its mine sequencing and inflow predictions, which led it to revise its water surplus predictions (see below).

Water Treatment & Discharge Volume

To manage the predicted on-site water surplus and support the controlled release of water under EPL release conditions, Moolarben is proposing to install a reverse-osmosis water treatment facility and associated storage ponds adjacent to the existing rail loop (see Figure 5) to reduce salinity and metals concentrations. The facility would treat all surplus mine water prior to controlled release discharge into the Goulburn River. Moolarben Coal initially proposed to address its water surplus by increasing the approved discharge volume from 10 ML/day to 20 ML/day.

In response to EPA's and the community's concerns about the proposed increase in discharge volume, Moolarben Coal reviewed its potential discharge scenarios. Following this review, it proposed to stage its discharge volumes based on operational activities which are predicted to increase water make (eg. mining in UG4), as follows:

- up to 10ML/day until the end of 2021, and following mining in UG4;
- up to 15 ML/day during operations in UG4 (scheduled from 2022 to 2026); and
- up to 20 ML/day during prolonged wet periods, but only with the EPA's approval.

Both the Department and the EPA have accepted this approach to limiting the discharge volumes from the Moolarben Coal Mine and consider that it more realistically reflects the actual discharge requirements from the approved mining operations.

While Moolarben Coal is allowed under its EPL to discharge up to 10 ML/day, no discharges have occurred from the site since 2011. The Department considers that for the majority of the life of the mine, the actual discharge volumes would be less than the existing 10 ML/day discharge limit. During median climatic conditions (ie 50%ile) only 4 ML/day on average would need to be discharged. The Department and EPA accept that the water make would increase once underground mining commences in UG4, however this would only be for a 5 year period, and would result in discharges of less than 11 ML/day under average climatic conditions (compared to the current EPL discharge limit of 10 ML/day).

Further, as discussed in detail below, water would be treated prior to discharge to reduce the salinity and metals concentrations, and therefore the water quality of the receiving environment would improve compared to the quality of the water that is currently allowed to be discharged.

The Department accepts that there needs to be strict controls in place to manage temporary higher volume releases during prolonged wet periods. Consequently, the Department has recommended conditions that reflect the proposed staged discharge volume limits and requires Moolarben to obtain authorisation from the EPA before any additional release volumes above 15 ML/day can be discharged.

6.3 Surface Water

Moolarben Coal engaged WRM and Advisian to assess the surface water impacts of the proposed modifications. The key potential surface water impacts would be associated with the increased volume of controlled water releases to the Goulburn River, which could affect water quality, the flow regime, channel stability and flooding.

Water Quality

Moolarben Coal initially proposed to treat water it proposes to be discharged to a quality that complies with the existing EPL EC concentration limit of 900 $\mu\text{s}/\text{cm}$ and other water quality indicators (pH, soil & grease, total suspended solids and turbidity). Moolarben Coal proposed this EC limit as this is the limit currently allowed under the EPL, and it is the limit that Ulan Coal Mine treats its surplus water to before discharging to the Goulburn River diversion (see **Figure 8**).

The assessment showed that at the proposed maximum discharge of 20 ML/day at 900 $\mu\text{s}/\text{cm}$, and together with the discharges from the Ulan Coal Mine, there would be negligible adverse change in downstream water quality when compared to historic water quality recorded in the Goulburn River.

Concerns were raised in community submissions about the water quality impact on the Goulburn River, particularly in relation to salinity. The EPA (see Appendix 7) asked for further information to justify the proposed 900 $\mu\text{s}/\text{cm}$ EC discharge limit, as it considered that the background 80%ile salinity concentration upstream of the Goulburn River Diversion is around 580 $\mu\text{s}/\text{cm}$ to 600 $\mu\text{s}/\text{cm}$. This figure is based on monitoring from site GS 210046 which it considers to be the least impacted, pre-mining data set.

Following further consultation with the EPA and the Department, Moolarben has agreed to revise its proposed discharge EC limit in accordance with the *Australian & New Zealand Guidelines for Fresh and Marine Water Quality 2018*. The guideline allows consideration of the 80%ile upstream salinity level of the receiving waters to derive an appropriate background salinity concentration level.

Moolarben Coal used data from two upstream monitoring locations (ie UMC SW01 and GS 210046) and derived a 100%ile salinity trigger value at the point of release to the Goulburn River Diversion of 685 $\mu\text{s}/\text{cm}$.

The EPA (refer to Appendix E) subsequently recommended:

- a salinity EC limit of 685 $\mu\text{s}/\text{cm}$ and a volumetric discharge limit of 10 ML/day until the end of 2021;
- a salinity EC limit of 600 $\mu\text{s}/\text{cm}$ and a volumetric discharge limit of 15 ML/day between 1 January 2022 and 31 December 2027; and
- a salinity EC limit of 600 $\mu\text{s}/\text{cm}$ and a volumetric discharge limit of 10 ML/day thereafter until the end of the mine life.

The EPA also recommended a water study to be undertaken by an independent scientific organisation and consistent with the ANZECC Guideline to determine the long-term salinity EC limit for discharges from the Moolarben Coal Mine. Moolarben Coal has committed to undertake the study, which would involve sampling from locations endorsed by the EPA.

The Department and EPA agree that there is scope for the mine to improve the quality of water it discharges and that treating the water to further reduce its salinity and metals concentrations would have beneficial effects for the Goulburn River. The Department also agrees with EPA that an independent water study would determine the background EC concentration target for the mine to achieve as it increases its discharges over time. Therefore, the Department has recommended that an independent water quality study to be completed by June 2021 which:

- is undertaken by an independent scientific organisation with suitable water expertise;
- collects and utilises additional water quality data in the Goulburn River from locations endorsed by the EPA;
- determines appropriate background salinity and heavy metal levels for the Goulburn River upstream of the project site; and
- recommends an EC limit for treated water discharges to the Goulburn River when mining is undertaken in UG4 and thereafter.

The Department has also recommended that:

- all discharges are to meet an EC concentration limit of 685µs/cm until the end of December 2021; and
- all discharges after the end of December 2021 to meet an EC limit derived by the independent water quality study.

The EPA has reviewed the Department's recommended water quality conditions and does not object to them.

Metals Concentrations

Moolarben Coal proposes to design its water treatment facility design to meet ANZECC trigger levels for metals concentrations at the point of release. The EPA supports this commitment and requested that appropriate trigger levels are better defined by further review and analysis of background surface water quality monitoring data.

The ANZECC Guideline provides that trigger levels for metals should be based on either a "default" 95% species protection trigger levels, or where metal concentrations in the Goulburn River naturally exceed the 95% species protection level, "site-specific" trigger levels would be developed based on the 80th percentile concentration of historic monitoring data.

The proposed design criteria for metal concentrations are consistent with the ANZECC Guideline "default" trigger values, with the exception of aluminium (where the site-specific 80%ile value is greater than the default value).

Background data from 2007 to 2017 collected from Ulan Coal Mine site SW01 located upstream of the proposed relocated EPL discharge point in the Goulburn River was used in the assessment (see Attachment 1 of the RTS at Appendix D). The EPA agreed that this monitoring site is the appropriate reference site for determining site-specific trigger values for heavy metals.

In line with the EPA's advice in relation to discharge quality, the Department has recommended that the independent water quality study determine the appropriate metals concentrations in accordance with the ANZECC Guidelines and in consultation with the EPA. It is acknowledged that this may include a wider suite of metals and major ions to those proposed by Moolarben Coal.

Flow Regime, Channel Stability and Flooding

Moolarben Coal would relocate the EPL Discharge Point 1 from its current location on Bora Creek to the confluence of Bora Creek and the Goulburn River Diversion (see **Figures 8 and 9**). Discharge water would be piped from the water treatment facility to a rock platform at the relocated discharge point where it would drain into the Goulburn River via a flow spreader/diffuser.

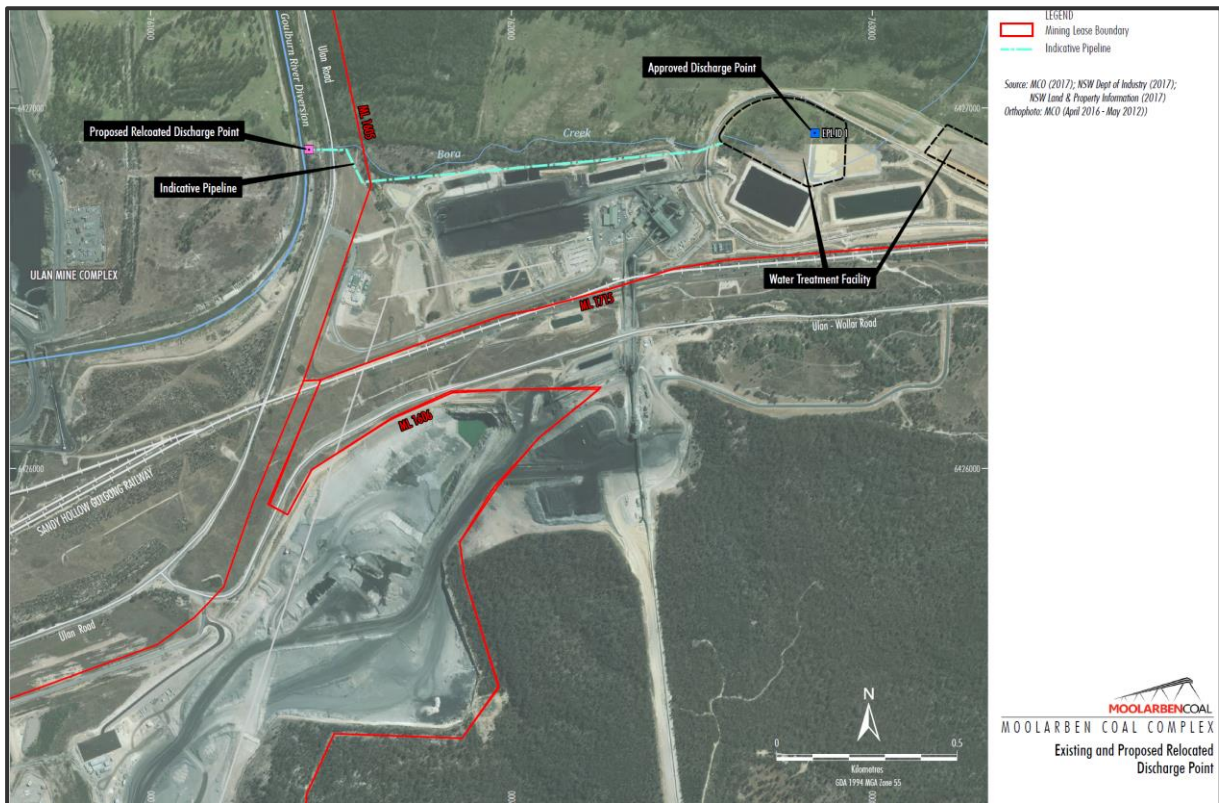


Figure 8 | Existing and proposed discharge point



Figure 9 | Proposed location of the discharge point to the Goulburn River Diversion

The Department and EPA inspected the proposed new discharge point and consider it has benefits in comparison to the existing discharge point which would be subject to erosion of the sandy channel bed of Bora Creek. The spreader/diffuser proposed to be used on the rock platform would limit the velocity of flow of the discharge and therefore minimise the scouring potential of the bed of the Goulburn River. The IESC also commented that relocating the discharge point to a more appropriate location would reduce the risk of scouring.

In terms of potential flow and channel stability impacts in the Goulburn River, Moolarben Coal's hydraulic model predicts that for the low flow scenarios in which Moolarben Coal's discharge constitutes the majority of flow in the Goulburn River, the estimated velocity would be in the range expected to result in minimal scouring impacts, even if the bed of the river was a bare sandy surface. Given that the diversion channel and the Goulburn River downstream are well vegetated, the estimated average velocity for low, medium and high flows modelled would not be expected to result in any material scouring or channel stability impacts.

Similarly, the predicted increases in channel depth as a result of the controlled releases are considered minor. For the worst-case scenario where 20 ML/day would be discharged under a high flow situation, the maximum depth increase in the diversion and from 2 km to 9.4km downstream of the discharge point would be between 0.02 m to 0.06 m.

The Department considers that this scenario represents the maximum predicted impact, and that this would result in minimal environmental consequences, as:

- flow and velocity increases would be unlikely to result in scouring of the discharge point, or in the river diversion downstream of the proposed discharge point, particularly considering the existing river diversion contains a well-established, thick reed lined bed; and
- predicted increases in water levels would easily be contained within the Goulburn River channel's capacity and would be unlikely to have any influence on the flooding regime or access downstream of the mine.

The predicted changes in water depth, water flow and channel velocity would vary during each stage of the project in line with the various operating scenarios and discharge volumes. However, any impacts would reduce over time in line with the reduction in controlled releases in the later stages of mining.

Based on this assessment, the Department considers that the increased discharges into the Goulburn River would not have a significant impact on channel flow regimes, stability or flooding.

The Department and the EPA accept that it is difficult to establish what the "natural" flows are in the Upper Goulburn River catchment given the changes that have occurred within the catchment as a result of mining operations and the diversion of the Goulburn River. It is also acknowledged that there is a lack of reliable daily flow data from the Goulburn River upstream and downstream of the proposed discharge point.

This issue was also raised by the IESC, which recommended that Moolarben Coal cooperates with neighbouring mine operators to install a flow and water quality monitoring point on the Goulburn River downstream of the confluence of Wollar Creek to measure the cumulative surface water impacts of the three mines.

Given the high location of the proposed discharges in the headwaters of the Goulburn River and that a large section of the river flows through the Goulburn River National Park, the Department agrees that it is important to implement a flow monitoring program in the Upper Goulburn River to assess flow-related impacts from minewater discharges. Consequently, the Department has recommended a condition requiring Moolarben Coal to monitor flows upstream and downstream of its proposed discharge point daily. The monitoring would be described in the Surface Water Management Plan for the mine, which would be updated in consultation with EPA to reflect the proposed modifications.

Other Potential Surface Water Impacts

Changes to the disturbance areas at the mine because of the modifications are considered unlikely to result in measurable increases to runoff volumes to receiving watercourses, particularly given that a large portion of the disturbance areas would be within the catchment of the existing water management system.

Similarly, although the modifications would slightly alter the disturbance areas near Moolarben Creek for the haul road between OC2 and OC3, the design of the haul road and necessary culverts would not change. The proposed modifications would therefore not be likely to increase the flood impacts in Moolarben Creek beyond that which have already been considered and approved.

6.4 Brine Management

The volume of brine that would be generated from the water treatment process would vary throughout the life of the mine. The estimated annual volume of brine generated from 10 ML/day of treated water would under median climatic conditions be around 0.7 ML/day, and from 20 ML/day of water under wet climatic conditions (10%ile) would be around 2.1 ML/day. These volumes would be proportionally reduced with the proposed reduction in the volume of water treated at the water treatment facility in the next few years and following mining in UG4.

The majority of brine generated from the treatment process would be preferentially managed at the surface, by diluting it with stored water and using it for dust suppression on haul roads, active mining areas and coal stockpiles.

Residual brine is proposed to be:

- temporarily stored in dedicated by-product storage dams, or other mine water storages (e.g. OC2 and OC3 mine water dams);
- reticulated to mining or waste emplacement areas draining to internal catchments with any runoff recaptured in the mine water management system;
- evaporated in dams or via other evaporative techniques; and
- permanently stored underground UG4 within the coal seam aquifer once void space is available.

In response to concerns about the potential impacts of using brine water for dust suppression, Moolarben Coal confirmed that brine water would only be used on active mining areas where runoff would be recaptured in the water management system. To ensure that brine stored at the surface would not leach to surface water, the new brine storage dams would be designed to meet EPA's design criteria⁴. The Department has recommended this standard as a performance measure in the conditions of approval.

In response to concerns raised regarding the proposal to dispose of brine in underground workings, Moolarben Coal twice engaged Dr Noel Merrick to provide further information and advice on this issue⁵. The first advice indicated that the depressurisation of the coal seam and the overlying formations during mining would result in the UG4 void remaining a groundwater sink for about 30-35 years and migration of groundwater from the UG4 void would not occur for at least this period.

Following the recovery of groundwater levels to pre-mining levels, it is expected that no significant change to the salinity of the surrounding groundwater would occur. This is due to the density of the brine acting to restrict the migration of highly saline groundwater. Most of the groundwater in the void that migrates would move laterally and remain in the coal seam aquifer and there would be significant dilution of any groundwater migrating from within UG4 by groundwater within the surrounding and overlying strata.

⁴ to be lined and achieve a permeability standard of at least 1×10^{-9} m/s over 1000mm

⁵ refer to Attachment 4 of the Response to Submissions at Appendix C

The second advice concluded that the potential impact of brine storage in UG4 void to the quality of groundwater would be less than what was previously assessed (ie. insignificant impact to groundwater). In relation to the effect of molecular diffusion of salts in the brine, the impact would be negligible compared to the macro transport mechanisms that were considered in the original analysis. The risk of impacts from storing brine underground to surrounding groundwater resources is therefore considered to be very low.

Moolarben Coal has maintained that its preference in the long-term would be to permanently store brine underground instead of storing it at the surface, as it would avoid the need to build and maintain additional storage dams and would eliminate the risk of uncontrolled discharge to surface water during extreme climatic events.

The Department accepts that of the options put forward, storing brine underground represents the lowest environmental risk. The volumes of brine to be disposed of would be relatively minor (ie. the volume of brine generated from 10 ML/day of water treatment would be approximately 0.7 ML/day under 50%ile climatic conditions). Further, the Department considers that most of the brine produced would be diluted with mine water and used for dust suppression, and a minor residual volume would need to be stored.

To describe the disposal and storage options, and to manage unforeseen impacts, in accordance with EPA's recommendation, the Department has recommended that Moolarben Coal prepares a Brine Management Plan prior to operating the water treatment facility. The plan would detail the methods that would be used to manage brine; the proposed brine storage locations and the volumes of brine that would be managed at each location; details the measures that would be implemented to minimise impacts from the storage of brine at the surface, and the transfer and disposal of brine in underground workings.

6.5 Aquatic Ecology

Stream health data from the upper Goulburn River observed during 2001 to 2017 was analysed to assess the effects of current discharges from the Ulan Coal Mine on aquatic ecology and to compare this to the proposed discharges from the Moolarben Coal Mine. Ulan Coal Mine has discharged an average of 11 ML/day since 2011, at an EC level of 900 $\mu\text{s}/\text{cm}$.

The assessment shows that there are no threatened aquatic species or endangered populations or communities in the Upper Goulburn River upstream of the Goulburn River National Park.

There has been no significant change in aquatic ecology diversity or abundance over the period that was analysed.

Moolarben Coal's discharges from the mine would be unlikely to change the aquatic ecology of the Goulburn River. This is because the discharges would maintain flows in the river, which would avoid low flow periods that would potentially result in the development of shallow stagnating ponds which are detrimental for fish and aquatic macroinvertebrates.

The analysis of existing aquatic ecology data indicates that historic discharges from the Ulan Coal Mine, which have reduced low and no-flow periods in the Goulburn River, have not resulted in adverse impacts to aquatic ecology in the Goulburn River.

In terms of toxicity of discharges on the aquatic ecology of the Goulburn River, the Department recognises EPA's comments that salinity is a surrogate measure for a range of specific salinity ions and that each ion and mix of ions can induce varying degrees of toxicity to aquatic life.

Moolarben Coal conducted its own analysis of the ionic make-up of discharge mine water and compared this to the ionic make-up of the water in the Goulburn River, based on monitoring sites both upstream and downstream of the proposed controlled release point⁶. The mine water and Goulburn River water were found to have similar

⁶ refer to Attachment 2 of the RTS at Appendix C

ionic properties. Therefore, the water discharged from the mine would be unlikely to adversely impact aquatic ecology.

The Department considers that the EC limit, and metal concentrations of the discharge water would be derived in accordance with the methodology required by the ANZECC Guidelines, which “represent the best current estimates of the concentrations of chemicals that should have no significant adverse effects on the aquatic ecosystem” (ANZECC, 2000).

The IESC also raised potential impacts of discharges on in-stream macrophytes in the diversion channel, specifically in relation to their capacity to survive sustained higher flows, consequences of sediment mobilisation and potential contamination from metals and other contaminants.

Discharges at volumes greater than 15 ML/day would only occur during extreme and prolonged climatic conditions. Over the life of the mine, discharges would average around 4 ML/day, and around 11 ML/day during the 5-year period when mining is being undertaken in UG4. The Department also notes that:

- the risk of sediment mobilisation from the controlled releases is low when conservatively compared to a bare sandy surface, and further reduced for the Goulburn River diversion channel due to the presence of the existing thick reed bed;
- turbidity would be controlled by removal of sediment prior to treatment through the water treatment facility and by controlling the velocity of discharges using the spreader/diffuser at the discharge point; and
- potential geomorphic impacts with respect to river height, flow velocity and channel stability would be minimal.

The Department therefore considers that these factors, combined with the ANZECC derived discharge water quality limits proposed for EC and metals, would ensure the risk of adverse impact to aquatic ecology from the controlled discharges would be minimised throughout the life of the mine.

6.6 Biodiversity Impacts and Offsets

The previous biodiversity assessments for the mine were updated for the proposed modifications. The updated assessment builds on the extensive biodiversity work that has been carried out at the mine complex over the last decade, including the detailed surveys for Stage 1 and Stage 2 of the project⁷ and the recently completed assessment for the approved extension to OC1⁸.

The updated biodiversity assessment included additional targeted surveys of the proposed modification impact areas during 9 days of surveys completed between November 2016 and October 2017. The surveys also targeted the potential impacts to fauna from disturbance of hollow bearing trees and cliff line habitats.

The proposed modifications would disturb approximately 82 ha of land, comprising 39 ha of native vegetation (including 7 ha of threatened ecological communities) and 43 ha of cleared land. Fauna habitat would also be impacted, including small areas of cliff line features, for 42 threatened fauna species, including 28 birds, 3 mammals and 11 bats.

As outlined in Section 4 above, the project was determined to be a controlled action under the EPBC Act due to potentially significant impacts on MNES for listed threatened species and communities.

⁷ Completed by Moolarben Biota in 2006 and Ecovision in 2008.

⁸ Completed by EMGA Mitchell McLennan in 2013.

The Commonwealth referral decision in determining that the action is a controlled action was based on there being likely significant impacts on:

- 2 critically endangered ecological communities (CEECs), the Central Hunter Valley Eucalypt Forest and Woodland, and White Box -Yellow Box- Blakely's Red Gum Grassy Woodland and Derived Native Grassland; and
- 5 threatened fauna including - Regent Honeyeater, Swift Parrot, Large-eared Pied Bat, Corben's Long-eared Bat and Koala.

The land disturbance would be mostly associated with the OC2 and OC3 pit extensions. The minor increase to the OC2 pit limit in the south-east is considered necessary to avoid leaving a potentially geotechnically unstable section of hill between the current pit limit and Moolarben Creek.

However, as part of its modification applications, Moolarben Coal is proposing to not clear 35 ha of land approved to be disturbed for mining and surface infrastructure associated with OC3. This includes the OC3 out-of-pit emplacement area, which is no longer required for permanent waste rock emplacement, with waste rock instead be now used as backfill material for OC2 and OC3.

Of the 35 ha of land proposed to be relinquished, 12 ha comprises vegetation communities considered equivalent to those proposed to be disturbed for the proposed modifications. The resulting residual area of native vegetation that would be cleared for the proposed modifications would be 27 ha (ie. 39 ha less 12 ha) of native vegetation.

The additional, relinquished and net clearing proposed for these modifications are summarised in **Table 7** below by Plant Community Type (PCT) and Biometric Vegetation Type (BVT). The table also identifies EECs listed under the *Biodiversity Conservation Act 2016* (BC Act) and the EPBC Act.

Table 7: Summary of proposed, relinquished and net native vegetation clearing

PCT/BVT	Proposed Clearing (ha)	Equivalent Relinquished Clearing (ha)	Net Clearing (ha)
Endangered Ecological Communities (EECs)			
PCT 281/ HU714 ¹ - Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion	1.5	0.5	1
PCT 618/ HU730 ¹ - White Box - Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter	3.5	0.5	3
PCT 1176/HU618 ² - Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion	2	2 ³	0
TOTAL EECs	7	3	4
Other Native Vegetation Communities			
PCT 1606/HU820 - White Box – Narrow-leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter	3	1	2
PCT 1629/HU843 - Narrow-leaved Stringybark – Grey Gum shrubby open forest on sandstone ridges of the Sydney Basin	13	6.5	7

PCT/BVT	Proposed Clearing (ha)	Equivalent Relinquished Clearing (ha)	Net Clearing (ha)
PCT 1661/HU875 - Narrow-leaved Ironbark - Black Pine - Sifton Bush heathy open forest on sandstone ranges of the upper Hunter and Sydney Basin	4	1	3
PCT 1669/HU883 - Red Ironbark - Grey Gum - Narrow-leaved Stringybark - Brown Bloodwood shrubby open forest on sandstone ranges of the Sydney Basin	4.5	0	4.5
PCT 1696/HU910 - Blakely's Red Gum - Rough-barked Apple shrubby woodland of central and upper Hunter	7.5	0.4	7.1
TOTAL - Other Native Vegetation Communities	32	9	19
Total Native Vegetation	39	12	27
Species Credit Species			
Regent Honeyeater	31	10.5	20.5
Koala	4	0.5	3.5
Brush-tailed Rock Wallaby	37	10.5	26.5

Notes:

1. Listed as Critically Endangered White Box-Yellow Box-Blakeley's Red Gum Grassy Woodland under the EPBC Act and Endangered White Box Yellow Box Blakely's Red Gum Woodland under the BC Act.
2. Listed as Critically Endangered Central Hunter Valley Eucalypt Forest and Woodland under the EPBC Act, also listed as a Vulnerable Ecological Community (VEC) - Hunter Valley Footholds Slaty Gum Woodland in the Sydney Basin Bioregion under the BC Act.
3. There is 3.5 ha within the relinquishment area, however only 2 ha identified to reduce net clearing to zero.

In accordance with the savings provisions of the BC Act, the assessment was completed using the Framework for Biodiversity Assessment (FBA) Credit Calculator for Major Projects to determine impact credits and the BioBanking Assessment Methodology (BBAM) was used to calculate the credit value of the biodiversity offsets. The FBA was used to calculate ecosystem and species credits for the 12 ha of native vegetation associated with the relinquishment areas to ensure that the net impact credit liability was appropriately determined.

The Department and OEHL consider that it is reasonable that relinquishment areas of equivalent biodiversity value to the proposed disturbance areas can be used to reduce the overall net biodiversity impact of the modifications for the purposes of the NSW approval.

However, DoEE advised that as the clearing for the modification is a separate action under the EPBC Act, for MNES species the impact of the modification and subsequent offset obligations need to be based on the full disturbance area, not the reduction available from including the relinquished areas. There are three separate existing EPBC approvals that apply to the Moolarben Coal Mine and one or all of these could be varied, subject to approval of the Commonwealth, to formally reduce the amount of approved clearing to reduce the offset liability, consistent with the relinquished areas identified in these modification applications. Otherwise, the full disturbance credit liability would be required to be offset for EPBC species that are likely to be significantly impacted.

The Department notes that:

- Ecological Australia, Moolarben Coal Mines ecological consultant, assessed the significance of impacts on threatened species and concluded that there would be no significant impact on threatened species, including MNES;
- the area of net clearance (27 ha) is relatively minor and confined to incremental clearing along the approved edge of the open cut pit area, compared to the wider habitat distribution of the potentially affected species and communities surrounding the project area;

- native woodland/forest would be progressively re-established on rehabilitated areas; and
- Moolarben Coal's supplementary land-based Biodiversity Offset Strategy (BOS), would largely compensate any residual impacts (see below), with mine site rehabilitation proposed to contribute 28% of total ecosystem impact credits.

The Department considers that the proposed impacts are acceptable, subject to the identified avoidance, mitigation and offsetting measures, including the relinquishment of the equivalent vegetation type and quality of land which was previously approved for clearing would further avoid impact to native vegetation.

As outlined above, DoEE determined that the modification is a controlled action due to its likely significant impact on 7 threatened species/ communities. OEH has also provided an assessment of impacts on MNES and the Department has supplemented this review with a detailed assessment of impacts on MNES (see **Appendix H**).

Biodiversity Offset Strategy

Moolarben Coal is proposing to supplement the existing Biodiversity Offset Strategy for the mine with an additional offset strategy to compensate for residual biodiversity impacts. The FBA Credit Calculator determined that the modifications would require a total of 1,437 ecosystem credits and species credits for the Regent Honeyeater (1,568), Koala (77) and Brush-tailed Rock Wallaby (693) for the net clearing (total less relinquishment areas). The credit liability is higher for the Commonwealth action being assessed as the total clearing is required to be considered (see **Table 8** below).

To satisfy these requirements, Moolarben Coal has proposed a strategy which includes securing an additional land-based offset, known as the 'Gilgal' property, and using alternative mechanisms available under the BC Act. Moolarben Coal owns 'Gilgal', which is located to the south-west of the modification areas (see **Figure 10**).

The baseline biodiversity survey for 'Gilgal' and the associated Biobanking Assessment Report (BAR) has confirmed that the property would create 4,880 ecosystem credits, of which 1,033 ecosystem credits would be appropriate to partially compensate the biodiversity impacts of the proposed modifications. The property would also generate species credits based on habitat potential for the Regent Honeyeater (4,182), Koala (64) and Brush-tailed Rock Wallaby (3,781). 'Gilgal' would therefore satisfy all credits required by the modifications except for 404 ecosystem credits and 13 species credits for the Koala (see **Table 8**).

OEH has reviewed and accepted the calculations as presented in the BAR. It has also confirmed that the Gilgal offset property has been mapped as important habitat for Regent Honeyeater.

In terms of long term security of the Gilgal property, Moolarben Coal has committed to secure the property as a biodiversity stewardship site under the BC Act. In accordance with OEH's recommendation, the Department has recommended a condition requiring an application to secure the required credits associated with the Gilgal property under a stewardship agreement to be made by the end of March 2021.

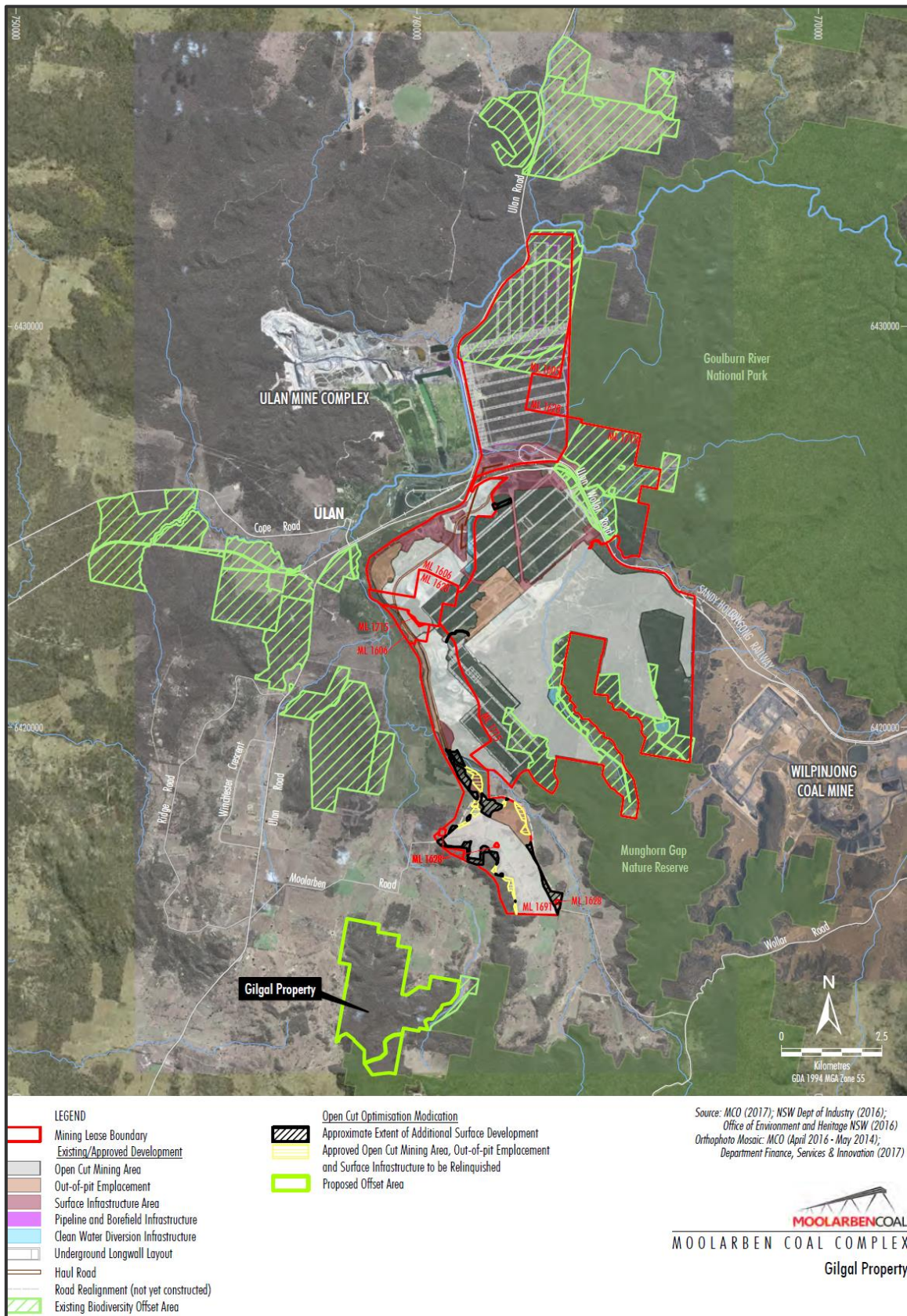


Figure 10 | Gilgal offset property

Table 8: Summary of NSW and Commonwealth offset credit requirements

Vegetation Community / Species	Credits required		Gilgal Offset Credits		Residual Credits	
	NSW	Cth	NSW	Cth	NSW	Cth
Ecosystem Credits¹						
PCT 281/ HU714 ²	35	53	35 - (5 ha)	53	-	-
PCT 618/ HU730 ²	73	112	0	0	73	112
PCT 1176/ HU618 ³	0	108	N/A	108	-	-
PCT 1606/ HU820	150	190	150 - (14 ha)	175	-	15
PCT 1629/ HU843 ⁴	411	827	411 - (53 ha)	827	-	-
PCT 1661/ HU875 ⁵	204	237	204 - (22.5 ha)	237	-	-
PCT 1669/ HU883 ⁶	233	233	233 - (33.4 ha)	183	-	50
PCT 1696/ HU910	331	354	0	0	331	354
Total	1,437	2,114	1,033 (121.5 ha)	1,583	404	531
Species Credits						
Regent Honeyeater	1,568	2,371	1,568 (221 ha)	4,182	-	-
Koala	77	94	64 (9 ha)	64	13	30
Brush-tailed Rock Wallaby	693	-	693 (98 ha)	-	-	-

Notes:

- The MNES species considered likely to be significantly impacted that are ecosystem credit species under the FBA include the Swift Parrot, Corben's Long-eared Bat and the Large-eared Pied Bat, with the Regent Honeyeater and Koala identified as species credit species.
- Listed as Critically Endangered White Box-Yellow Box-Blakeley's Red Gum Grassy Woodland under the EPBC Act and Endangered White Box Yellow Box Blakeley's Red Gum Woodland under the BC Act.
- Listed as Critically Endangered Central Hunter Valley Eucalypt Forest and Woodland under the EPBC Act, also listed as a Vulnerable Ecological Community (VEC) - Hunter Valley Foothills Slaty Gum Woodland in the Sydney Basin Bioregion under the BC Act.
- Under the FBA offsetting option rules PCT 1629/ HU843 can be offset by PCT 1660/HU874 (Narrow-leaved Ironbark heathy woodland on sandstone ranges of the Sydney Basin and Brigalow Belt South).
- Under the FBA offsetting option rules PCT 1661/ HU875 can be offset by PCT 479/HU702 (Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion).
- Under the FBA offsetting option rules PCT 1669/ HU883 can be offset by PCT 1176/HU618 (Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion). For Commonwealth offsetting requirements as the total impact is required to be offset rather than the net clearing following relinquishment of areas, 108 credits of the available 291 credits of HU618 are required to offset clearing of HU618 leaving a residual of 183 credits available to offset HU883 under the option rules. This leaves a residual offset liability of 50 credits.

Moolarben Coal also confirmed that it intends to satisfy its residual biodiversity offset credit obligations by re-establishing woodland on a large portion of the OC2 and OC3 rehabilitation areas. In relation to mine site rehabilitation, to meet the NSW offset requirements around 150 ha of mine site rehabilitation would be restored with Blakeley's Red Gum (123ha) and White Box, Grey Box Red Gum (27ha).

This would be sufficient to satisfy the required residual PCT 618 and PCT 1696 ecosystem credits and Koala species credits. Additional mine-site rehabilitation may be required to meet the Commonwealth offsetting requirements, subject to potential application to DoEE to vary the approved controlled actions as discussed above. DoEE has

also advised the Department that there may be sufficient area within the Gilgal offset property to meet its full offset liability for Box Gum Woodland and threatened fauna likely to be significantly impacted as the vegetation communities contain sufficient area of habitat (see Appendix H). That is, there are a number of options available to DoEE to ensure that the full offset liability from MNES is met for the modifications and incorporated into the Commonwealth determination.

OEH considers that rehabilitation areas can be used to generate biodiversity credits, provided that ecological rehabilitation and completion criteria are developed. If the ecological rehabilitation standard for which biodiversity credits have been generated is not able to be achieved, then Moolarben Coal would need to source and retire an equivalent number and type of biodiversity credits to meet the offset requirement.

The Department has therefore recommended conditions requiring rehabilitation and completion criteria to be developed to demonstrate that the credits generated in the rehabilitation areas are sufficient to offset the relevant residual credit requirements. It is also recommended that the rehabilitation performance criteria are developed in consultation with OEH, and that there is flexibility to use other mechanisms under BC Act 2016 to retire credits, if the rehabilitation does not meet the performance criteria.

The Department accepts that optimising the OC2 and OC3 pits would result in some clearing of native vegetation. However, the pit extensions present the most efficient and cost-effective option to extract the coal resource and increase coal recovery, and also clearing is necessary to ensure stability of some of the pit walls. The Department considers that the net overall disturbance area associated with the pit extensions has been reduced as far as possible by relinquishing areas of native vegetation that were previously approved to be cleared. The Department also considers that the implementation of the supplementary offset strategy will suitably offset any residual impacts associated with this clearing and improve the conservation value of the region in the medium to long term.

The Department has recommended a range of conditions to ensure the supplementary Biodiversity Offset Strategy is implemented, including requirements to:

- apply to secure the 'Gilgal' offset areas under a stewardship agreement by the end of March 2021;
- develop suitable rehabilitation performance and completion criteria for the vegetation communities to be established in the rehabilitated OC2 and OC3 landforms to generate the residual offset credits; and
- secure and retire the residual credits through establishment of vegetation communities in rehabilitation areas, or through alternative mechanisms.

6.7 Air Quality

Todoroski Air Sciences (TAS) prepared an air quality assessment for the proposed modifications.

The assessment shows that no exceedances of relevant criteria for $PM_{2.5}$, PM_{10} , total suspended particulates or dust deposition are predicted to occur at any privately-owned receptor from the mine including the modifications.

The predictions of cumulative impacts from the Moolarben, Ulan and Wilpinjong mines and background non-mining sources indicate that no additional days above the average 24-hour $PM_{2.5}$ criterion, and the potential for 1 or 2 additional days per year above the average 24-hour PM_{10} criterion at the closest sensitive receiver locations.

Following the provision of additional information and clarification in relation to the air quality modelling, the EPA has confirmed that it is generally satisfied with the air quality modelling and predictions. However, the EPA noted the following residual issues, which it recommended be addressed in the conditions of approval:

- emission control efficiency for watering of roads;
- assessment of $PM_{2.5}$ impacts; and
- effectiveness of the current reactive management system.

Emission control efficiency for watering of roads

The air quality assessment shows that the watering of roads can reduce measured roadside concentration of dust by more than 90%. This level of control efficiency was demonstrated in site-specific test work conducted in 2014 as part of a Pollution Reduction Program (PRP) imposed by the EPA, and this level was assumed in the air quality modelling for the modifications.

While the EPA accepted this analysis, it questioned if this level of control was being achieved at the mine at all times. The EPA further recommended a condition of approval requiring Moolarben Coal to achieve and maintain a 90% or greater level of control efficiency on dust from roads at the site.

The Department notes that the air quality performance outcomes for the mine are effectively regulated by the air quality limits in the Stage 1 and Stage 2 project approvals. The existing conditions of approval also require Moolarben Coal to implement best management practice to minimise the particulate emissions from the project.

In addition, the Department notes that the proposed modifications would not change the number of fleet items, the peak daily intensity of material movement, or the proximity of activities to receivers or exposed areas, which are all key elements that may result in dust emissions. The Department also notes that recent monitoring results from the mine demonstrate that the mine is complying with approved air quality criteria.

The Department considers that the existing air quality criteria and control conditions are adequate to ensure the mine continues to minimise air quality emissions to an acceptable level, and that a specific condition to regulate control efficiency for dust on roads is not warranted in this instance.

PM_{2.5} Impacts

The EPA questioned that there could be residual uncertainty and conservatism in the PM_{2.5} predictions due to the lack of available site-specific PM_{2.5} data. Consequently, the EPA recommended the installation of a PM_{2.5} monitor at the site and for the mine to implement all reasonable and feasible PM_{2.5} emission controls, including evaluation and adoption of best practice diesel emission controls.

Moolarben Coal has committed to install the real-time PM_{2.5} monitor to enable site-specific PM_{2.5} concentration data to be collected in the future, and to include this as part of its Air Quality Monitoring Program. The Department supports this commitment and has recommended a condition of approval to give effect to its installation.

Further, in relation to diesel emissions, the Department notes that EPA has recently presented to the mining industry about a proposed future PRP that would seek to establish baseline diesel combustion emissions at mine sites and identify practicable (ie technically and operationally feasible) mitigation measures to reduce these emissions through the use of site-specific controls tailored to specific mining fleets. If, during this process, the EPA determines that any further or specific management measures should be implemented, then these measures could be reflected and implemented through the EPL and in the Air Quality Management Plan. The Department believes this represents a consistent approach to regulating this issue across the industry.

However, the Department notes recent variations to the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*. The Approved Methods now include 24-hour average PM_{2.5} criteria of 25 µg/m³ and annual average criteria of 8 µg/m³ and have lowered the annual average PM₁₀ criterion from 30 µg/m³ to 25 µg/m³. The mine should technically be regulated against the air quality modelling and assessment criteria established in the Approved Methods 2005. However, in recognition of the fact that the updated criteria have been developed for the purposes of protecting human health and amenity, and consistent with recent practice, the Department considers that the impacts of the project should be regulated against the more stringent and contemporary 2016 standards.

The Department has therefore recommended that the project approvals incorporate the air quality criteria established in the Approved Methods 2016. The assessment shows that mining operations including the modifications would not result in exceedances of either the Approved Methods 2005 or the Approved Methods 2016 assessment criteria at any private receivers. However, predicted cumulative impacts indicate the potential for 1 or 2 additional days per year above the average 24-hour PM₁₀ criterion at the closest receiver locations. As discussed below, Moolarben Coal proposes to use its existing reactive management system (ie real-time dust monitoring and the modification of mining operations during adverse weather) to mitigate the predicted additional exceedance days of the 24-hour PM₁₀ criterion.

The Department recognises that the Voluntary Land Acquisition and Mitigation Policy (VLAMP) has recently been updated to require the application of mitigation or acquisition rights for exceedances of the Approved Methods 2016 assessment criteria. Notwithstanding, the Department considers that there are no properties without existing acquisition rights where the criteria would be exceeded, and that no further mitigation measures or acquisition rights are required to be implemented to manage predicted air quality impacts.

Effectiveness of the current reactive management system

Moolarben Coal's additional modelling predicted that additional exceedances of the 24-hour average PM₁₀ limits could be avoided through the implementation of predictive and reactive measures (ie. mining activities were "paused" in the modelling to simulate implementation of reactive management). However, the EPA does not believe this modelling replicates implementation of the reactive management system in practice, and that it simply shows that ceasing certain activities is sufficient to mitigate these predicted exceedances.

In its Response to Submissions Moolarben Coal presented evidence that its existing performance in relation to air quality showed no exceedances of particulate matter criteria at private receivers. It considers that this demonstrates the effectiveness of the current reactive air quality management at the mine.

The Department accepts that the modification would result in very minor increases in air quality impacts and that these would remain below existing and the newer, more stringent, air quality criteria. The Department considers that the existing conditions which require the implementation of best practice management of air quality impacts, and in accordance with an approved Air Quality Management Plan to evaluate and report on the effectiveness of the air quality management system, would remain effective for the proposed modifications.

Rail Dust

The increase in product coal rail movements along the Sandy Hollow-Gulgong Railway of one additional train per day on average and two additional trains per day at peak (ie. total of 8 trains per day on average and 11 trains per day at peak) were assessed for additional coal dust impacts. The assessment shows that the increase in TSP and PM₁₀ concentrations would be very low (around 0.7 µg/m³ and 0.3 µg/m³ respectively) and would not make any appreciable difference to the approved air quality impacts previously assessed along the rail line.

The Department notes that air quality impacts on the railway line are regulated by the EPA under Australian Rail Track Corporation's (ARTC's) EPL 3142, and EPA has the power to require ARTC to implement further mitigation measures along the railway.

Conclusion

Overall, the Department considers that the proposed modifications would not materially increase the air quality impacts compared to those already approved and that the current regulatory regime would continue to effectively manage impacts. In recognition that the updated air quality criteria provided in the EPA's Approved Methods 2016 have been developed for the purposes of protecting human health and amenity, and consistent with recent practice, the Department has recommended conditions requiring the project to comply with the more conservative and contemporary 2016 standards for both PM_{2.5} and PM₁₀.

Under the existing conditions, the Air Quality Management Plan for the mine would need to be updated to reflect the proposed changes to the activities at the mine.

6.8 Other Issues

The Department has summarised its assessment of a range of other matters in **Table 9**. These matters are considered to be minor and not determinative and would be regulated under the existing conditions of approval.

Table 9: Other Issues

Issue	Findings
Operational Noise	<ul style="list-style-type: none"> The EPA noted that the proposed modifications include additional mitigation measures that would ensure compliance with the existing EPL noise limits. As the pit boundaries would be slightly closer to private receivers to the west of the mine, a marginal increase in received noise levels may result when coal is extracted at the modified OC2 and OC3 pits at the maximum increased rate. Notwithstanding this marginal increase in noise levels, the predictions show that the mine would continue to comfortably comply with the existing noise limits at all private residences. Attended monitoring reports and the results of recent independent reviews of the noise impacts of the mine show that low frequency noise is not an issue for this mine. This is expected to continue during the activities associated with the proposed modifications. The Department therefore considers that the proposed modifications would not result in material increases in operational noise impacts beyond that already approved. Any additional impacts would be effectively monitored using existing on-site systems and documented in the mine's Noise Management Plan, which would be updated to incorporate the proposed modifications.
Rail Noise	<ul style="list-style-type: none"> The increase in product coal rail movements along the Sandy Hollow-Gulgong Railway would result in a negligible (ie less than 1dB(A)) increase noise levels for all assessed scenarios, and as such is unlikely to be perceptible at any private residences. The assessment concluded that rail noise from the project on its own, and considered cumulatively, would continue to comply with the relevant criteria in the <i>Rail Infrastructure Noise Guideline</i>. Rail noise impacts are regulated by the EPA under the Australian Rail Track Corporation (ARTC) EPL (3142), and the EPA has the power to require ARTC to implement further measures along the railway to mitigate impacts if required.
Blasting	<ul style="list-style-type: none"> The predicted ground vibration and airblast emissions from blasting in the open cut extension areas would not exceed relevant criteria for human comfort or damage criteria for public infrastructure, building structures or Aboriginal cultural heritage sites, including rock shelters. The Department considers that the modifications would have similar impacts to those already approved and that these can be appropriately managed under the existing Blast Management Plan, which would be updated in accordance with the current conditions.
Cultural and Historic Heritage	<ul style="list-style-type: none"> OEH did not object to the proposed modifications based on impacts to Aboriginal cultural heritage. Archaeological surveys and an Aboriginal Cultural Heritage Assessment was undertaken for the areas related to the proposed changes to the pits in consultation with registered Aboriginal parties. The 9 new sites identified in the additional disturbance areas are not considered to be scientifically or aesthetically significant. Notwithstanding, the Department acknowledges that these sites have significance to the Aboriginal community. However only 2 of these sites would be impacted, and the Department considers that they would be salvaged prior to any disturbance in accordance with procedures and protocols described in the

Issue	Findings
	<p>approved Heritage Management Plan for the mine, which would be updated to incorporate the new sites.</p> <ul style="list-style-type: none"> The Department considers that in context, the additional impacts to cultural heritage are not significant. Considerable conservation areas are located near the mine, including the Munghorn Gap Nature Reserve and the Goulburn River National Park, which contain a greater amount of similar and representative heritage evidence to that identified within the modification areas. There were no historic heritage items identified within the modification areas. The Department considers that the proposed modifications would not have a significant impact on the Aboriginal cultural heritage values of the locality or region, and notes that Moolarben Coal would be required to update the existing approved Heritage Management Plan to incorporate the recommended management requirements for the additional Aboriginal sites identified.
Rehabilitation	<ul style="list-style-type: none"> The approved OC3 out of pit emplacement would not be developed. Waste rock excavated during the initial development of OC3 would be temporarily stockpiled and used to backfill OC2 and OC3. OC2 is approved to be rehabilitated back to a combination of agricultural land and woodland regeneration. Under the proposed modifications, OC2 would be rehabilitated to woodland only, to improve conservation outcomes. OC3 is approved to be rehabilitated to agricultural land. However, under the proposed modifications, the area would be rehabilitated to a combination of agricultural land in the flatter areas adjacent to Moolarben Creek, and woodland communities on the steeper areas where the landform meets the ridges to the west of the pit. These changes would provide Moolarben Coal with the opportunity to meet its residual offset obligations through site rehabilitation and enhance habitat connectivity in the local landscape. The proposed changes to the open cut pits would not affect the approved final void or landforms.
Greenhouse Gas	<ul style="list-style-type: none"> The updated greenhouse gas emissions assessment shows that increasing the open-cut ROM coal extraction by 3 Mtpa would result in an increased in emissions of 0.038 MtCO₂-e. The Department notes that the estimated increase in emissions as a result of the modifications is equivalent to 0.029% of the emissions in NSW during 2014 and 0.0069% of the emissions in Australia during 2016⁹. Moolarben Coal would continue to undertake a range of standard operating procedures to minimise its emissions. The increase in production would not require changes to the existing mining fleet, and the fleet would continue to be regularly maintained. Its emissions would be monitored and reported in accordance with the with the existing Greenhouse Gas Minimisation Plan, which would be updated to incorporate the proposed modifications. The Department accepts that the GHG emissions predicted to be generated by the proposed modifications are negligible in the state and national context, and that they can be minimised appropriately under the existing Greenhouse Gas Minimisation Plan.
Visual	<ul style="list-style-type: none"> The EA indicates that the potential visual impacts of the key activities associated with the proposed modifications from sensitive viewpoints (eg. residences and public roads) would be negligible, given: <ul style="list-style-type: none"> the ridgelines and natural vegetation adjacent to the OC2 and OC3 pits would continue to be higher than the mining landforms, and would block views of the pits from private residences; the proposed additional infrastructure, including the water treatment facility, would be located adjacent to existing infrastructure and would therefore blend in with the architecture of the existing mine complex; and

⁹ In 2014, the most recent year for which State emissions data is available, NSW greenhouse gas emissions were 130.1 MtCO₂-e. In 2016, the Australian greenhouse gas emissions were 550.2 MtCO₂-e.

Issue	Findings
	<ul style="list-style-type: none"> - the temporary soil stockpiles would be sown with grasses to limit the visual impacts. • Moolarben Coal would continue to undertake a range of standard operating practices to mitigate the visual impacts of the mine, including the progressive rehabilitation of disturbed land, and shading buildings and structures. • Under the existing conditions, Moolarben Coal is required to minimise the visual impacts of the project.
Traffic and Transport	<ul style="list-style-type: none"> • There would be no increase in the peak workforce or deliveries due to the proposed modifications, and accordingly no additional impacts on the capacity, condition, safety or efficiency of the surrounding road network would be expected. • A short-term increase in the construction workforce would be required for the changes to site infrastructure. However, this increase would be well within the maximum number of construction workers previously assessed and approved for the mine and would therefore be unlikely to change the traffic impacts of the mine. • Concerns were raised about the impact of increased train movements on the Sandy Hollow-Gulgong Railway, including issues associated with the capacity of the existing line, increased delays at level crossings and the potential increase in dust, noise and risk of fire. • Rail movements between the mine and the Port of Newcastle are managed by the ARTC. Moolarben Coal received written confirmation from ARTC (dated 20 October 2017) that sufficient rail capacity would be available for the increase rail movements resulting from the proposed modifications. • Although the number of rail departures from the mine would increase, cumulative rail traffic on the Sandy Hollow-Gulgong Railway would continue to be constrained by the capacity of the Bylong Tunnel, which requires a minimum of 20 minutes between trains, to meet tunnel ventilation criteria. Therefore, unless an upgrade to the Bylong Tunnel were to occur (e.g. a duplication), the proposed modifications would have no effect on the peak level crossing waiting times. • The additional rail movements associated with the proposals would cause very minor increases in rail noise and rail dust levels, which would remain below the relevant criteria. Any potential additional fire risks would be managed by ARTC under its operating procedures.
Socio-economic	<ul style="list-style-type: none"> • Concerns were raised that cumulative social impacts were not assessed and that the modifications would not increase jobs or job security. One submitter claimed that noise and air quality limits are only achieved through ongoing purchase of properties adjacent to the mine. • The EA indicates that the Modifications would not change the peak workforce of 740 previously assessed for the mine and would therefore not create additional adverse social impacts (eg. demand for services). • However, there would be a short-term increase in the construction workforce required to implement the changes to site infrastructure, which is also not expected to create additional demand for services as the construction workforce would remain well within the maximum already assessed and approved for the mine. • The proposed modifications would not change the noise limits in the existing approvals, and stricter air quality limits would apply to private-owned receivers. Compliance with these limits is predicted for the proposed modifications, and no additional property acquisition would be required. • The Department therefore accepts that the proposed modifications would be unlikely to increase the current cumulative socio-economic impacts. • However, the increase in coal production is expected to yield an additional \$82 million (\$69 in net present value) in royalty revenue to the NSW Government over the life of the mine.
'The Drip'	<ul style="list-style-type: none"> • The Drip is a locally recognised important cliff seepage feature located on the Goulburn River about 13.5 km north of the proposed open cut pit extension areas.

- As the proposals do not seek to change the underground mining component of the mine, there would be no additional effect on The Drip.
- The existing Stage 1 project approval requires Moolarben Coal to ensure that the project has no greater than a negligible impact on groundwater supply to The Drip.
- In terms of the long-term protection of the area containing The Drip, the Department can confirm that:
 - Moolarben Coal signed all relevant documents to transfer 'the Drip' to the NSW National Parks & Wildlife Service in March 2015; and
 - OEH lodged subdivision plans for the area in February 2018 and has confirmed that it will lodge a plan to register the area as a State Conservation Area following the NSW Lands & Registry Service approval of the new lots.



7. Evaluation

The Department has assessed the two modification applications in accordance with the relevant provisions of the EP&A Act, including the principles of ecologically sustainable development.

The proposed modifications would allow an increase in the amount of coal mined at the Moolarben Coal Mine each year by 3 million tonnes. However operational efficiencies would allow this additional coal to be mined without changing the existing mine fleet or increase the workforce.

The proposed modifications also seek to change how water is managed at the mine. The mine has updated its groundwater model which has predicted an increase in groundwater inflow which would need to be managed at the surface. Moolarben Coal has identified that it would require increasing its allowable discharge rate to the Goulburn River during average and wet years.

It has proposed to treat mine water before it is discharged to a superior quality than currently allowed. Through close consultation with the Department and the EPA, Moolarben Coal has agreed to revise its proposed discharge volumes to the following:

- a discharge limit of 10 ML/day prior to commencing and following the completion of mining in UG4;
- up to 15 ML/day during operations in UG4, and temporary higher volume releases during prolonged wet periods.

It has also agreed to treat water discharges to achieve an EC of 685 $\mu\text{s}/\text{cm}$ until it commences UG4 and engage an independent expert to undertake a detailed water quality study to derive appropriate long-term water quality objectives in accordance with the ANZECC *Guidelines for Fresh and Marine Water Quality*.

From a strategic perspective, the EPA is seeking to reduce salinity loads and improve water quality in the Goulburn and Hunter River catchments to address cumulative impacts on aquatic ecology and maintain the integrity of the Hunter River Salinity Trading Scheme.

Therefore, the treatment of water to a higher standard before discharge, and the independent water quality would result in a significant improvement compared with the current situation and ensures that the water quality objectives in the longer term are informed by sufficient baseline data and are derived in accordance with applicable guidelines.

In terms of impacts to biodiversity, the Department and OEH consider that the proposed clearing for the modifications is relatively minor, and that residual impacts can be mitigated through the proposed land-based offset and mine site rehabilitation. It is also noted that an area of land approved for disturbance would now not be disturbed for the project, further mitigating the overall biodiversity impacts.

In terms of social and economic benefits for the Mid-Western Regional Council local government area, and the State of NSW, the Department notes that the following benefits would accrue:

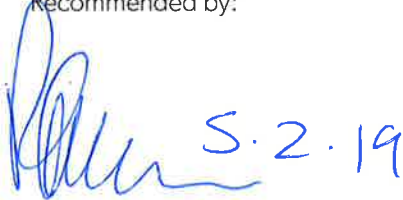
- temporary employment generated during the construction of site infrastructure;
- continued direct employment of up to 740 persons at full production; and
- increased royalty payments of around \$82 million to the NSW Government over the life of the Moolarben Coal Complex.

The Department believes its recommended revisions to the conditions of approval provide a comprehensive, strict and precautionary approach to ensuring the project would continue to comply with performance measures and standards, and that the predicted residual impacts would be effectively avoided, minimised, mitigated and/or compensated.

Based on its assessment, the Department considers that the proposed modification requests are in the public interest and should be approved, subject to the revised stringent conditions outlined in **Appendix I**.

The Department's assessment report is hereby presented to the Independent Planning Commission to determine the applications.

Recommended by:

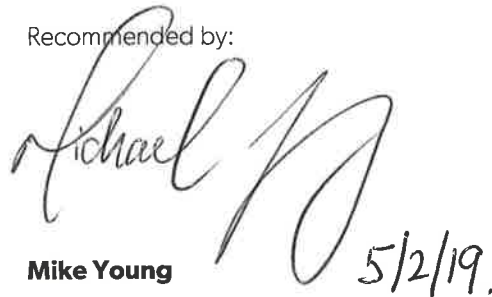


Paul Freeman

Team Leader

Resource and Energy Assessments

Recommended by:



Mike Young

A/Executive Director

Resource Assessments and Compliance



Appendices

Appendix A – List of Documents

- *Moolarben Coal Complex Open Cut Optimisation Modification Environmental Assessment* (2 volumes) dated October 2017 (see Appendix B)
- *Moolarben Coal Complex Open Cut Optimisation Modification Response to Submissions* dated May 2018 (see Appendix D)
- Supplementary Government agency advice (see Appendix E)
- Moolarben Coal responses to information requests from the Department of Planning and Environment and Environment Protection Authority dated 24 August 2018 (see Appendix E)
- Project Approvals 05_0117 and 08_0135 (see Appendix I)

Appendix B –Environmental Assessment

Moolarben Coal Complex Open Cut Optimisation Modification Environmental Assessment (2 volumes) dated October 2017 is available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

Appendix C – Government Agency Advice and Community Submissions

Available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

Appendix D - Response to Submissions

Moolarben Coal Complex Open Cut Optimisation Modification Response to Submissions dated May 2018 is available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

Appendix E – Government Agency Supplementary Advice

Available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

E1: OEH Science Advice (4/6/18)

E2: OEH response to RTS report (6/6/18)

E3: DPI L&W response to RTS report (20/6/18)

E4: EPA response to RTS report (5/7/18)

E5: EPA recommended conditions (18/9/18)

Appendix F – Moolarben Coal Responses to Information Requests

Available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

F1: Additional information from Moolarben Coal – Covering Letter (24/8/18)

F2: Additional information from Moolarben Coal – Enclosure 1 – Response to DPE (24/8/18)

F3: Additional information from Moolarben Coal – Enclosure 2 – Response to EPA (24/8/18)

Appendix G – IESC Advice

Available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

Appendix H – EPBC Controlled Action Assessment

In accordance with the bilateral agreement between the Commonwealth and NSW Governments, the Department provides the following additional information required by the Commonwealth Minister, in deciding whether or not to approve a proposal under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Department's assessment has been prepared based on the assessment contained in the Moolarben Coal Complex Open Cut Optimisation Modification Environmental Assessment (EA) (including the Biodiversity Assessment Review (BAR) in Appendix C of the EA), Moolarben Coal's Response to Submissions and supplementary information provided during the assessment process, public submissions, and advice provided by the NSW Office of Environment and Heritage (OEH) and other NSW agencies, the Commonwealth Department of the Environment and Energy (DoEE) and the Commonwealth's Independent Expert Scientific Committee on Coal Seam Gas and Large Mining Development (IESC).

This Appendix is supplementary to, and should be read in conjunction with, the assessment included in Section 6 of this assessment report which includes the Department's consideration of impacts to listed threatened species and communities, impacts to water resources and avoidance, mitigation and offsetting measures for threatened species, including for Matters of National Environmental Significance (MNES).

H.1 Impacts on EPBC Listed Species and Communities

As outlined in Section 6 of this report, the modification was considered by DoEE to likely to have significant impacts on 7 threatened species or ecological communities listed under the EPBC Act, namely:

- Central Hunter Valley Eucalypt Forest and Woodland Critically Endangered Ecological Community (CEEC);
- White Box-Yellow Box-Blakely's Red Gum Woodland and Derived Native Grasslands CEEC (Box Gum Woodland CEEC);
- *Anthochaera phygia* (Regent Honeyeater);
- *Lathamus discolor* (Swift Parrot);
- *Chalinolobus dwyeri* (Large-eared Pied Bat);
- *Nyctophilus corbeni* (Corbens Long-eared Bat); and
- *Phascolarctos cinereus* (Koala).

The Department has also considered the impacts of the action on the following 17 EPBC listed species which were identified by DoEE as requiring further consideration:

- 8 flora species: *Prasophyllum* sp Wybong, Hoary Sunray, Tarengo Leek orchid, *Tylophora linearis*, *Homoranthus darwiniodes*, *Dichanthium setosum* (Bluegrass), *Philothea ericfolia* and Austral Toadflax; and
- 9 fauna species: Brush-tailed Rock-wallaby, Spotted-tailed Quoll, Painted Honeyeater, Superb Parrot, Greater Glider, New Holland Mouse, Broad-headed Snake, Pink-tailed Worm Lizard and Striped Legless Lizard.

Ecological assessed the likelihood of occurrence of these species occurring at the site (see Appendix C of Appendix C of the EA) and the significance of the impacts on these species using the methodology outlined in *Matters of National Environmental Significance Significant Impact Guidelines* as documented in Appendix G of the Biodiversity Assessment Review (BAR - Appendix C of the EA).

Ecological concluded that the modification would be unlikely to have a significant impact on any MNES, including the 7 species considered by DoEE as likely to have a significant impact due to the proposed action. Nonetheless,

the Department notes DoEE's finding that it considered there is likely to be a significant impact and further detailed consideration of the impact of the action on these 7 species is therefore warranted and is provided below.

Species unlikely to be significantly impacted

In relation to *Prasophyllum* sp Wybong, Hoary Sunray, Tarengo Leek orchid, *Tylophora linearis*, *Philotheca ericfolia*, Austral Toadflax, Superb Parrot, Greater Glider, New Holland Mouse, Broad-headed Snake, Pink-tailed Worm Lizard and Striped Legless Lizard Ecological (see Appendix C of Appendix C of the EA) concluded that based on there was no habitat present and the species were unlikely to be impacted and no further assessment was undertaken.

In relation to *Dichanthium setosum* (Bluegrass) and *Homoranthus darwiniodes*, these species are known to occur in the Mudgee-Wollar region but were not recorded in the disturbance footprint area following targeted field surveys. Following consideration of impacts and assessment of significance in Appendix G of the BAR, the Department accepts that impacts to these species are unlikely and would not require further mitigation or offsetting.

In relation to the Brush-tailed Rock-wallaby, the project would directly impact on 37 ha of potential habitat (26.5 ha net area if relinquished areas are considered). No individuals were recorded in the modification footprint area following targeted surveys and the area has not been identified as supporting an important population. The closest recording of this species is 15 km from the proposed disturbance area. There are substantial areas of potential habitat in adjoining National Park estate. Following consideration of impacts on the Brush-tailed Rock-wallaby in Appendix G of the BAR, the Department accepts the finding of Ecological that impacts to this species are unlikely to be significant and would not require further mitigation or offsetting.

Nevertheless, under the NSW offsetting requirements, the Brush-tailed Rock-wallaby is identified as a species credit species that requires offsetting. The clearing of 39 ha generates 960 species credits. The proposed Gilgal offset area contains 3,781 species credits, based on 532.5 ha of available habitat. Under the NSW recommended offsetting arrangements, which is based on the net clearing (of 26.5 ha (693 species credits), the Department has recommended that the Gilgal offset area be used to retire 693 credits.

In relation to, the Spotted-tailed Quoll, the project would impact on 28 ha of potential habitat. Surveys undertaken for the project did not identify this species. The proposed disturbance areas are adjacent to areas previously disturbed for agricultural activities and are therefore unlikely to host den sites for this species. Following consideration of impacts on the Spotted-tailed Quoll in Appendix G of the BAR, the Department accepts the finding of Ecological that impacts to this species are unlikely to be significant and would not require further mitigation or offsetting.

Nevertheless, under the NSW offsetting requirements, the Spotted-tailed Quoll is identified as an ecosystem credit species that requires offsetting. The clearing of 28 ha generates 1,599 ecosystem credits. The proposed Gilgal offset area contains 3,781 species credits, based on 532.5 ha of available habitat. Under the NSW recommended offsetting arrangements, which is based on the net clearing of 19.5 ha, the Department has recommended that the Gilgal offset area be used to retire 1,071 credits against Plant Community Types (PCTs) associated with the habitat of the quoll.

In relation to the Painted Honeyeater, evidence of foraging of this species has not been recorded in the proposed disturbance area. While the proposed modifications would remove 28 ha of potential habitat, there is a large contiguous area of habitat available in areas adjacent to the mine. Following consideration of impacts and assessment of significance in Appendix G of the BAR, the Department accepts the finding of Ecological that impacts to these species are unlikely to be significant and would not require further mitigation or offsetting.

Nevertheless, under the NSW offsetting requirements, the Painted Honeyeater is identified as an ecosystem credit species that requires offsetting. The clearing of 28 ha generates 1,599 ecosystem credits. The proposed Gilgal offset area contains 3,781 species credits, based on 532.5 ha of available habitat. Under the NSW recommended offsetting arrangements, which is based on the net clearing of 19.5 ha, the Department has recommended that the Gilgal offset area be used to retire 1,071 credits against PCTs associated with the habitat of the Painted Honeyeater.

Species likely to be significantly impacted

Central Hunter Eucalypt Forest and Woodland CEEC

In relation to the Central Hunter Eucalypt Forest and Woodland CEEC, the proposals would remove around 2 ha of this community (*HU618/PCT1176 - Slaty Box - Grey Gum shrubby woodland on footslopes of the Upper Hunter Valley, Sydney Basin Bioregion*). Areas containing this community exist around the proposed disturbance areas, including within large areas of intact vegetation associated with the nearby Goulburn River National Park and the Munghorn Gap Nature Reserve.

Ecological concluded that it would be unlikely there would be a significant impact on this CEEC as the relinquishment areas contain 3.5 hectares of this community and therefore there would be a net reduction in clearing. However, as this is a separate controlled action the assessment must consider only the impacts of the proposed clearing, rather than the net clearing. The Department accepts DoEE's finding that there is likely to be a significant impact on this CEEC. The clearing of 2 ha of this CEEC generates 108 ecosystem credits.

The Gilgal Offset area includes 33.41 ha of Slaty Box - Grey Gum shrubby woodland on footslopes of

the upper Hunter Valley, Sydney Basin Bioregion which generates 291 credits. That is, there are sufficient credits in the Gilgal biodiversity offsets to retire credits to meet the Commonwealth offsetting requirements. For the NSW offset requirements there are no residual offsetting requirements as there is no net increase in clearing for this community.

For a consistent approach, an option that may be available is for the applicant to vary the relevant approved actions for the Moolarben Coal Mine site to formally relinquish clearing of the 3.5 ha of the Central Hunter Eucalypt Forest and Woodland CEEC identified in the modification application, subject to further DoEE assessment and approval.

There are no recovery plans or threat abatement plans for the Central Hunter Eucalypt Forest and Woodland CEEC. However, there is Conservation Advice for this CEEC (see discussion below).

Box Gum Woodland CEEC

In relation to Box-Gum Woodland, the proposals would remove around 5 ha of this community (including around 2 ha of woodland and 3 ha of derived native grassland). The relevant vegetation communities are:

- *PCT 281/ HU714 - Rough-Barked Apple - Red Gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion – clearing of 1.5 ha (53 ecosystem credits); and*
- *PCT 618/ HU730 - White Box - Grey Box - red gum - Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter – clearing of 3.5 ha (112 ecosystem credits).*

Substantial areas containing this community exist in the surrounds of the proposed disturbance areas, including within large areas of intact vegetation associated with the nearby Goulburn River National Park and the Munghorn Gap Nature Reserve. This community has been fragmented through disturbance from mining and agriculture.

Ecological concluded that it is unlikely that there would be a significant impact on Box Gum Woodland CEEC. However, the Department accepts DoEE's finding that there is likely to be a significant impact on the Box Gum Woodland CEEC and therefore the impacts require offsetting.

Under the NSW recommended offsetting arrangements, which is based on the net clearing of 4 ha of Box Gum Woodland, the Department has recommended that the Gilgal offset area be used to retire 35 credits for vegetation type HU714/ PCT 281 and that, as none of this PCT is available in the Gilgal offset area, the residual 73 credits for HU730 / PCT 618 be met by mine site rehabilitation of 27 ha.

For Commonwealth requirements, there are 224 credits (32.4 ha) available of HU714/ PCT 281 in the Gilgal offset area so there is sufficient to offset the 53 credits required for this community. Additional mine site rehabilitation to HU730/ PCT 618, equivalent to the full 112 credits would be required to meet the Commonwealth offsetting requirements for PCT 618. This would require approximately 41 ha of mine site rehabilitation, an additional 14 ha to the NSW rehabilitation requirements. For Commonwealth offsetting purposes, there are sufficient credits across both PCTs combined to meet the total credit liability of 156 credits for Box Gum Woodland.

However, for a consistent approach, an option that may be available is for the applicant to vary the relevant approved actions for the Moolarben Coal Mine site to formally relinquish clearing of the 1 ha of the Box Gum Woodland CEEC identified in the modification application, subject to further DoEE assessment and approval.

There is a recovery plan and threat abatement plan for Box Gum Woodland (see below).

Regent Honeyeater and Swift Parrot

In relation to the Regent Honeyeater and Swift Parrot, evidence of foraging of these species has not been recorded in the proposed disturbance area. The proposals would remove 31 ha of potential habitat for Regent Honeyeater and 28 ha of potential habitat for the Swift Parrot. There is large contiguous area of available habitat for these species in areas adjacent to the mine.

Regent Honeyeater is a species credit species under the FBA, and 31 ha of habitat loss results in 2,371 credits. Under the NSW recommended offsetting arrangements, which is based on the net clearing of 10.5 ha of Regent Honeyeater habitat, the Department has recommended that the Gilgal offset area be used to retire 1,568 credits to meet NSW offsetting obligations. The Gilgal offset area includes 589 ha of Regent Honeyeater habitat which generates 4,182 credits which is sufficient to meet the Commonwealth offset requirements. However, for a consistent approach, an option that may be available is for the applicant to vary the relevant approved actions for the Moolarben Coal Mine site to formally relinquish clearing of the 10.5 hectares of Regent Honeyeater habitat identified in the modification application, subject to further DoEE assessment and approval.

Swift Parrot is an ecosystem species under the FBA and is associated with 28 ha of habitat (associated with PCTs HU730, HU820, HU843, HU875 and HU883) within the disturbance footprint. This equates to 1,599 ecosystem credits.

Under the NSW recommended offsetting arrangements, the Department has recommended that the Gilgal offset area be used to retire 1,033 ecosystem credits (121.5 ha) and undertake mine-site rehabilitation of 150 ha to meet offset requirements for all PCTs and associated ecosystem species.

For Commonwealth offsetting requirements for the Swift Parrot there is sufficient credits available to meet offset requirements for three of the associated vegetation communities, with a shortfall of 127 ecosystem credits for HU730 and HU820 (see Table L1 below). Additional mine site rehabilitation would be required to address the shortfall in credits. For Commonwealth offsetting purposes, there would be sufficient credits available in the Gilgal offset area based on the 5 PCTs that provide habitat for the Swift Parrot (see Table L1 below). However, for a consistent approach, an option that may be available is for the applicant to vary the relevant approved actions for

the Moolarben Coal Mine site to formally relinquish 12 ha of clearing in the modification application, subject to further DoEE assessment and approval.

There is Conservation Advice, an Approved Recovery Plan and Threat Abatement Plans for the Regent Honeyeater and Swift Parrot (see below).

Large-eared Pied Bat and Corben's Long-eared Bat

In relation to Large-eared Pied Bat and Corben's Long-eared Bat, the potential habitat to be removed has not been identified as supporting an important population and alternative habitat would remain in surrounding areas. Large-eared Pied Bat is an ecosystem species under the FBA and is associated with all 39 ha of habitat proposed to be cleared within the disturbance footprint. This equates to 2,114 ecosystem credits.

Under the NSW recommended offsetting arrangements, the Department has recommended that the Gilgal offset area be used to retire 1,033 ecosystem credits (121.5 ha) and undertake mine-site rehabilitation of 150 ha to meet offset requirements for all PCTs and associated ecosystem species.

For Commonwealth offsetting requirements for the Large-eared Pied Bat there is sufficient credits available to meet offset requirements for four of the associated vegetation communities, with a shortfall of 531 ecosystem credits for vegetation communities HU730, HU820, HU883 and HU910 (see Table L1 below). Additional mine site rehabilitation would be required to address the shortfall in credits. For Commonwealth offsetting purposes, there would be sufficient credits available in the Gilgal offset area based on the 8 PCTs that provide habitat for the Large-eared Pied Bat (see Table L1 below). However, for a consistent approach, an option that may be available is for the applicant to vary the relevant approved actions for the Moolarben Coal Mine site to formally relinquish 12 ha of clearing in the modification application, subject to further DoEE assessment and approval.

Corben's Long-eared Bat is an ecosystem credit species with associated habitat areas the same as the Swift Parrot, as outlined above. That is, the residual offsets are as outlined above and in Table L1 below. For Commonwealth offsetting purposes, there would be sufficient credits available in the Gilgal offset area based on the 5 PCTs that provide habitat for the Corben's Long-eared Bat (see Table L1 below).

There is an approved Recovery Plan for the Large-eared Pied Bat and approved Conservation Advice for Corben's Long-eared Bat (see below).

Koala

In relation to the Koala, evidence of foraging of these species has not been recorded in the proposed disturbance area. The proposals would remove 4 ha of potential habitat for the Koala. However, the number of feed trees that would be cleared is considered insignificant in comparison the number of trees that would not be affected in surrounding areas. The proposed disturbance area does not support a Koala population.

The Koala is a species credit species under the FBA, and 4 ha of habitat loss results in 94 species impact credits. Under the NSW recommended offsetting arrangements, which is based on the net clearing of 3.5 ha (77 credits) of Koala habitat, the Department has recommended that the Gilgal offset area be used to retire 64 credits and the residual 13 credits be met by mine site rehabilitation to rehabilitate 4 ha of Koala habitat, to meet NSW offsetting obligations. For Commonwealth offsetting purposes additional area of mine site rehabilitation would be required to generate the additional credits. However, for a consistent approach, an option that may be available is for the applicant to vary the relevant approved actions for the Moolarben Coal Mine site to formally relinquish clearing of the 0.5 hectares of Koala habitat identified in the modification application, subject to further DoEE assessment and approval.

There is approved Conservation Advice for the Koala (see below).

Table H-1 – Summary of Impacts and Offsets for EPBC MNES

Vegetation Community / Species	Credits required	Gilgal Offset Credits available	Residual Credits
Ecosystem Credit Species			
Box Gum Woodland (5ha)			
PCT 281/ HU714	53	224	0
PCT 618/ HU730	112	0	112
TOTAL	156	224	112
Central Hunter Woodland (2 ha)			
PCT 1176/ HU618	108	291	0
Swift Parrot and Corben’s Long-eared Bat associated habitat (28 ha)			
PCT 618/ HU730	112	0	112
PCT 1606/HU820	190	175	15
PCT 1629/ HU8431	827	1,023	0
PCT 1661/ HU8752	237	1,709	0
PCT 1669/ HU8833	233	291	0
TOTAL	1,599	3,198	127
Large-eared Pied Bat associated habitat (39 ha)			
PCT 1176/ HU618	108	291	0
PCT 281/ HU714	53	224	0
PCT 618/ HU730	112	0	112
PCT 1606/HU820	190	175	15
PCT 1629/ HU8431	827	1,023	0
PCT 1661/ HU8752	237	1,709	0
PCT 1669/ HU8833	233	183	50
PCT 1696/ HU910	354	0	354
TOTAL	2,114	3,605	531
Species Credits Species			
Regent Honeyeater	2,371	4,182	0
Koala	94	64	30

Notes:

- Under the FBA offsetting option rules PCT 1629/ HU843 can be offset by PCT 1660/HU874 (Narrow-leaved Ironbark heathy woodland on sandstone ranges of the Sydney Basin and Brigalow Belt South).
- Under the FBA offsetting option rules PCT 1661/ HU875 can be offset by PCT 479/HU702 (Narrow-leaved Ironbark- Black Cypress Pine - stringybark +/- Grey Gum +/- Narrow-leaved Wattle shrubby open forest on sandstone hills in the southern Brigalow Belt South Bioregion and Sydney Basin Bioregion).
- Under the FBA offsetting option rules PCT 1669/ HU883 can be offset by PCT 1176/HU618 (Slaty Box - Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Sydney Basin Bioregion). For Commonwealth offsetting requirements as the total impact is required to be offset rather than the net clearing following relinquishment of areas, 108 credits of the available 291 credits of HU618 are required to offset clearing of HU618 leaving a residual of 183 credits available to offset HU883 under the option rules. This leaves a residual offset liability of 50 credits.

H.2 Requirements for decisions about threatened species and endangered ecological communities

In accordance with Section 139 of the EPBC Act, in deciding whether or not to approve, for the purposes of a subsection of Section 18 or Section 18A of the Act, the taking of an action and what conditions to attach to such an approval, the Commonwealth Minister must not act inconsistently with certain international environmental obligations, Recovery Plans, or Threat Abatement Plans. The Commonwealth Minister must also have regard to relevant approved conservation advices.

Australia's international obligations

Australia's obligations under the *Convention on Biological Diversity* (Biodiversity Convention) include the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

The recommendations of this assessment report are not inconsistent with the Biodiversity Convention, which promotes environmental impact assessment (such as this process) to avoid and minimise adverse impacts on biological diversity. Accordingly, the recommended development consent requires avoidance, mitigation and management measures for listed threatened species and communities and all information related to the proposed action is required to be publicly available to ensure equitable sharing of information and improved knowledge relating to biodiversity.

Australia's obligations under the *Convention on Conservation of Nature in the South Pacific* (Apia Convention) include encouraging the creation of protected areas which together with existing protected areas would safeguard representative samples of the natural ecosystems occurring therein (particular attention being given to endangered species), as well as superlative scenery, striking geological formations and regions. Additional obligations include using their best endeavours to protect such fauna and flora (special attention being given to migratory species) so as to safeguard them from unwise exploitation and other threats that may lead to their extinction. The Apia Convention was suspended on 13 September 2006.

Recovery plans and approved conservation advice

Central Hunter Eucalypt Forest and Woodland CEEC

The Conservation Advice for Central Hunter Eucalypt Forest and Woodland CEEC aims to mitigate the risk of extinction of this community and help recover its biodiversity and function. The Department notes that there is no approved Recovery Plan for this CEEC that requires consideration under the EPBC Act.

While the project would clear 2 ha of this CEEC, equivalent to 108 ecosystem credits, the Gilgal offset area includes 33.41 ha of this CEEC equivalent to 291 ecosystem credits sufficient to satisfy offset liability. The Department notes that, while this is a separate controlled action and the total clearing is required to be assessed, there would be a net reduction in the clearing of this CEEC through the relinquishment of 3.5 ha that is approved to be cleared.

That is overall, the proposed modification would not lead to further reduction in the extent of clearing of this CEEC. As discussed above, there is an option to revise the approved controlled action actions to relinquish approved impacts, subject to separate review and approval by DoEE.

Box Gum Woodland CEEC

The recovery plan for Box Gum Woodland aims to achieve no net loss in extent and condition. The Department notes that there is no approved conservation advice for Box Gum Woodland CEEC that requires consideration under the EPBC Act.

While the project would clear 2 ha of the Box Gum Woodland CEEC and 3 ha of derived native grassland, substantive offsets are proposed such that the action would not be inconsistent with the Recovery Plan.

In particular, the Gilgal offset area includes 32 ha of Box Gum Woodland in total equivalent to 224 ecosystem credits. However, as outlined above there is a shortfall in vegetation community HU730 that would require additional mine site rehabilitation to meet the shortfall.

The Biodiversity Management Plan and Biodiversity Stewardship Agreements require detailed management actions and monitoring programs to maintain and/or improve the condition of Box Gum Woodland within these offset areas and to manage impacts on Box Gum Woodland at the project site.

Regent Honeyeater

The Department has considered the approved Conservation Advice and National Recovery Plan under the EPBC Act in assessing the impacts of the project on the Regent Honeyeater and notes that the main threats and causes for decline in population are clearing, fragmentation and degradation of its habitat.

The National Recovery Plan includes a number of objectives, recommendations and actions relevant to the project including maintaining and enhancing the value of Regent Honeyeater habitat and monitoring trends in Regent Honeyeater population size and dispersion.

While there is clearing of 31 ha of Regent Honeyeater habitat, noting that the modification proposes to relinquish 10.5 ha of approved clearing, the Gilgal offset area contains 589 ha of Regent Honeyeater habitat with sufficient area and credits available to fully offset the impact.

The Department considers that with the proposed site mitigation and offset measures (see Section 6.6 of the assessment report), the action would not be inconsistent with the Conservation Advice or the objectives of the Recovery Plan. The Department has recommended conditions to formalise these measures (refer to Schedules 3 and 4 of the recommended conditions in Appendix I). Key actions of the Recovery Plan including monitoring would also be implemented as part of the Biodiversity Management Plan and/or the Stewardship Agreement for the site and offset areas.

Swift Parrot

The Department has considered the approved Conservation Advice and National Recovery Plan under the EPBC Act in assessing the impacts of the project on the Swift Parrot and notes that one of the main the main threats and causes for decline in population are habitat loss and alteration, relevant to the consideration of the project impacts.

The National Recovery Plan includes an overall objective to prevent further population decline of the Swift Parrot and to achieve a demonstrable sustained improvement in the quality and quantity of Swift Parrot habitat to increase carrying capacity. The objectives include a range of monitoring and management strategies to meet the overall objective.

While there is clearing of 28 ha of Swift Parrot habitat, noting that the modification proposes to relinquish 8.5 ha of approved clearing, the Gilgal offset area contains 366 ha of Swift Parrot habitat with sufficient land-based offset area and credits available to offset 92% of the impact (see Table L1 above) with the residual offset through mine site rehabilitation.

The Department considers that with the proposed site mitigation and offset measures (see Section 6.6 of the assessment report), the action would not be inconsistent with the Conservation Advice and objectives of the Recovery Plan. The Department has recommended conditions to formalise these measures (refer to Schedules 3 and 4 of the recommended conditions in Appendix I). Key actions of the Recovery Plan including monitoring would also be implemented as part of the Biodiversity Management Plan and/or Stewardship Agreement for the site and offset areas.

Large-eared Pied Bat

The Department has considered the approved National Recovery Plan under the EPBC Act in assessing the impacts of the project on the Large-eared Pied Bat and notes the overall objective is to ensure the persistence of viable populations throughout its geographic range.

While there is clearing of 39 ha of Large-eared Pied Bat habitat, noting that the modification proposes to relinquish 15 ha of approved clearing, the Gilgal offset area contains 398 ha of Large-eared Pied Bat habitat with sufficient land-based offset area and credits available to offset 85% of the impact (see Table H-1 above) with the residual offset through mine site rehabilitation.

The Department considers that with the proposed site mitigation and offset measures (see Section 6.6 of the assessment report), the action would not be inconsistent with the overall objective of the Recovery Plan. The Department has recommended conditions to formalise these measures (refer to Schedules 3 and 4 of the recommended conditions in Appendix I). Key actions of the Recovery Plan including monitoring would also be implemented as part of the Biodiversity Management Plan and/or Stewardship Agreement for the site and offset areas.

The Department has recommended conditions to formalise these measures (refer to Schedules 3 and 4 of the recommended conditions in Appendix I).

Corben's Long-eared Bat

The Department has considered the approved Conservation Advice in assessing the impacts of the project on Corben's Long-eared Bat and notes that the main threats and causes for decline in population are habitat loss and fragmentation, relevant to the consideration of the project impacts.

The Conservation Advice actions include protection of known habitat, feral animal control programs, grazing and fire management.

While there is clearing of 28 ha of Corben's Long-eared Bat habitat, noting that the modification proposes to relinquish 8.5 ha of approved clearing, the Gilgal offset area contains 366 ha of habitat with sufficient land-based offset area and credits available to offset 92% of the impact (see Table L1 above) with the residual offset through mine site rehabilitation.

The Department considers that with the proposed site mitigation and offset measures (see Section 6.6 of the assessment report), the action would not be inconsistent with the Conservation Advice and objectives of the Recovery Plan. The Department has recommended conditions to formalise these measures (refer to Schedules 3 and 4 of the recommended conditions in Appendix I). Key actions of the Recovery Plan including monitoring would also be implemented as part of the Biodiversity Management Plan and/or Stewardship Agreement for the site and offset areas.

Koala

The Department has considered the approved Conservation Advice in assessing the impacts of the project on the Koala which identifies one of the main threats due to loss and fragmentation of habitat, which is relevant to the consideration of the project impacts.

While there is clearing of 4 ha of Koala habitat, noting that the modification proposes to relinquish 0.5 ha of approved clearing, the Gilgal offset area contains 9 ha of habitat with sufficient land-based offset area and credits available to offset 68% of the impact (see Table L1 above) with the residual offset through mine site rehabilitation.

The Department considers that with the proposed site mitigation and offset measures (see Section 6.6 of the assessment report), the action would not be inconsistent with the Conservation Advice and objectives of the Recovery Plan. The Department has recommended conditions to formalise these measures (refer to Schedules 3 and 4 of the recommended conditions in Appendix I). Key actions of the Recovery Plan including monitoring would also be implemented as part of the Biodiversity Management Plan and/or Stewardship Agreement for the site and offset areas.

Threat abatement plans (TAPs)

The threat abatement plans relevant to this action are discussed below and are available at <http://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/approved>.

- **Threat abatement plan for disease in natural ecosystems caused by *Phytophthora cinnamomi* (relevant to Box Gum Woodland)**

Phytophthora cinnamomi (*P. cinnamomi*) is a microscopic soil-borne organism that has the ability to cause plant disease and plant death by interfering with the movement of water and nutrients to plants. It can be spread in water, soil or plant material that contains the pathogen and dispersal is favoured by moist or wet conditions. It can be carried in both overland and subsurface water flow and by water moving infested soil or organic material. Native and feral animals have been implicated in spreading *P. cinnamomi*, particularly where there are digging behaviours. Humans, however, have the capacity to disturb and transport more soil than any other vector.

The Box Gum Woodland is identified as an ecological community that may be affected by *P. cinnamomi*.

The Department notes that, construction related activities have the potential to introduce or spread the pathogen through the movement of vehicles; the use of construction equipment/tools for breaking ground; footwear; or the introduction of infested soil or building materials to currently un-infested areas. The threat abatement plan for managing the impacts of *P. cinnamomi* identifies actions to minimise its spread to un-infested sites and mitigate impacts at infested sites.

The Department has recommended that actions to avoid and mitigate the spread of this plant disease are implemented as part of a Biodiversity Management Plan. Subject to this recommended condition, the Department considers approval of the proposed action would not be inconsistent with the threat abatement plan for disease in natural ecosystems caused by *P. cinnamomi*.

- **Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs (relevant to Box Gum Woodland)**

Feral pigs impact on native ecosystems and flora and fauna due to their presence, movement, rooting, wallowing, trampling, tusking or rubbing trees and consumption of water, animals, plants and soil organisms. Direct impacts from feral pigs include predation, habitat loss and degradation, competition and disease transmission, which can impact on native flora and fauna.

- **Threat abatement plan for competition and land degradation by rabbits (relevant to Regent Honeyeater)**

Rabbits have direct impacts on native flora and fauna, for example, by grazing on native vegetation and thus preventing regeneration and by competing with native fauna for habitat and food. Rabbits also have indirect and secondary effects, such as supporting populations of introduced predators and denuding vegetation, thereby exposing fauna species to increased predation. Their ecology, including digging and browsing also leads to a loss of vegetation cover and consequent slope instability and soil erosion, which further degrades fauna habitat.

- **Threat abatement plan for predation by feral cats (relevant to Swift Parrot)**

Feral cats are significant predators in Australia that interact with native fauna in various ways, including predation, competition for resources and transmission of disease.

Measures to control feral animals are recommended in the development consent conditions which would be implemented as part of a Biodiversity Management Plan and/or Stewardship Agreement(s) for the site and offset areas.

Therefore, the Department considers the approval of the action would not be inconsistent with the threat abatement plan for competition and land degradation by unmanaged goats; rabbits; and feral cats; predation, habitat degradation, competition and disease transmission by feral pigs.

- **Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (relevant to Box Gum Woodland)**

While cane toads have the potential to colonise new habitats created by the construction of sediment and detention basins, this species is not known to occur in the region and it is therefore unlikely that disturbance as a result of the proposed action would lead to the presence of cane toads.

H.3 Requirements for decisions about world heritage properties

The Commonwealth determined that the action is not a controlled action for the controlling provision of World Heritage (Section 12 and Section 15A of the EPBC Act) and therefore further consideration is not required.

H.4 Requirements for decisions about national heritage places

The Commonwealth determined that the action is not a controlled action for the controlling provision of National Heritage (Section 15B and Section 15C of the EPBC Act) and therefore further consideration is not required.

H.5 Additional EPBC Act considerations

Table L2 contains the additional mandatory considerations, factors to be taken into account and factors to have regard under the EPBC Act additional to those already discussed.

Table H-2 – Additional considerations for the Commonwealth Minister under the EPBC Act

EPBC Act section	Considerations	Conclusion
Mandatory considerations		
136(1)(b)	Social and economic matters are discussed in Sections 2 and 6 of the assessment report.	The Department considers that the proposed development would result in a range of benefits for the local and regional economy and is of public benefit. Negative social impacts, particularly on the local community residing in the area have been considered in the assessment of the development.
Factors to be taken into account		
3A, 391(2)	Principles of ecologically sustainable development (ESD), including the precautionary principle, have been taken into account, in particular: <ul style="list-style-type: none"> the long term and short term economic, environmental, social and equitable considerations that are relevant to this decision; conditions that restrict environmental impacts and impose monitoring and adaptive management, reduce any lack of certainty related to the potential impacts of the Moolarben Coal Mine; conditions requiring the project to be delivered and operated in a sustainable way to protect the environment for future generations and conserving the relevant matters of national environmental significance; advice provided within this report reflects the importance of conserving biological diversity, ecological and cultural integrity in relation to all of the controlling provisions for this project; and mitigation measures to be implemented which reflect improved valuation, pricing and incentive mechanisms are promoted by placing a financial cost on the proponent to mitigate the environmental impacts of the project. 	The Department considers that the project, if undertaken in accordance with the recommended conditions of consent, would be consistent with the principles of ESD.
136(2)(e)	Other information on the relevant impacts of the action – the Department is not aware of any relevant information not addressed in this assessment report.	The Department considers that all information relevant to the impacts of the project has been taken into account in this recommendation.
136(2)(fa)	Advice was sought from the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC).	The Department has reviewed the advice and recommendations of the IESC, and considered Moolarben Coal’s response to these matters in Section 6.3.
Factors to have regard to		
176(5)	Bioregional plans	There is no approved bioregional plan related to the activity.
Considerations on deciding on conditions		
134(4)	Must consider: <ul style="list-style-type: none"> information provided by the person proposing to take the action or by the designated proponent of the action; and the desirability of ensuring as far as practicable that the condition is a cost-effective means for the Commonwealth and the person taking the action to achieve the object of the condition. 	All project related documentation is available from the Department’s website www.majorprojects.planning.nsw.gov.au . The Department considers that the conditions at Appendix I are a cost-effective means of achieving their purpose. The conditions are based on the material provided by Moolarben Coal that was prepared in consultation with the

EPBC Act section	Considerations	Conclusion
		Department, DoEE, DPI Water, EPA, OEH and other agencies.

H.6 Conclusions on controlling provisions

Threatened species and communities (Sections 18 and 18A of the Act)

For the reasons set out in Section 6.6 and this Appendix, the Department recommends that the impacts of the action would be acceptable, subject to avoidance, mitigation measures described in Moolarben Coal’s Environmental Assessment and RTS and additional advice provided to the Department and the recommended conditions of consent in Appendix I.

A water resource, in relation to coal seam gas development and large coal mining development (Sections 24D and 24E of the Act)

For the reasons set out in Section 6.3 and this Appendix, the Department recommends that the impacts of the action on a water resource, in relation to coal seam gas development and large coal mining development would be acceptable, subject to the avoidance, mitigation measures described in Moolarben Coal’s Environmental Assessment and RTS and additional advice provided to the Department and the recommended conditions of consent in Appendix I.

H.7 Other protected matters

The Commonwealth Department of the Environment and Energy determined that other matters under the EPBC Act are not controlling provisions with respect to the proposed action. These include listed World Heritage, National Heritage, migratory species, Ramsar wetlands, Commonwealth marine environment, Commonwealth land, Commonwealth action, nuclear action, and Great Barrier Reef Marine Park and Commonwealth Heritage places overseas.

Appendix I – Recommended Conditions

Available at the Department's website at:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8711

I-1 - Recommended Consolidated Consent 05_0117 (Moolarben Coal Stage 1)

I-2 - Recommended Notice of Modification 05_0117 (Moolarben Coal Stage 1)

I-3 – Recommended Consolidated Consent 08_0135 (Moolarben Coal Stage 2)

I-4 – Recommended Notice of Modification 08_0135 (Moolarben Coal Stage 2)