NSW GOVERNMENT | Planning & Infrastructure

MAJOR PROJECT ASSESSMENT: Moolarben Coal Project Stage 2 & Stage 1 Modification (MOD 3)

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

February 2014

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EXECUTIVE SUMMARY

The Moolarben Coal Mine (Moolarben) is located 40 kilometres northeast of Mudgee in the Mid-Western local government area. The mine is owned and operated by Moolarben Coal Mines Pty Limited (MCM). Stage 1 of Moolarben was approved by the Minister in 2007, and started operating in 2010.

Together with the Ulan and Wilpinjong mines, it forms part of a large coal mining complex in the region that is currently allowed to extract up to 47 million tonnes of run-of-mine (ROM) coal a year, process it at existing coal handling and preparation plants, and export it to domestic and export markets via the Gulgong to Sandy Hollow Railway line. The mining complex is now one of the most significant mining complexes outside the Hunter Valley.

Most of the land in the vicinity of the complex is owned by one of the three mining companies, with only one privately-owned residence remaining in Ulan Village and 9 privately-owned residences remaining in Wollar Village. The closest "cluster" of private residences to the mining complex is located along Ridge Road, to the south of the Ulan mine and west of the Moolarben mine.

Large tracts of land surrounding the mining complex contain high quality native vegetation and have significant regional conservation values.

The Stage 1 approval allows for extraction of up to 12 million tonnes per annum (Mtpa) of ROM coal from three open cut pits and one underground mining domain. To date, MCM has constructed the surface infrastructure of the mine and is close to completing mining operations in the first open cut. MCM is yet to commence any of the approved underground mining operations.

MCM is proposing to expand its mining operations further to the east, and develop two additional underground mining domains and one additional large open cut mining pit. The proposal – known as the Moolarben Coal Mine Stage 2 Project – involves the extraction of an additional 16 Mt of run-of-mine (ROM) coal per year for a period of 24 years. The proposal also involves the construction of a range of associated infrastructure including ROM coal facilities, surface conveyors, support facilities and utilities. The Stage 2 project would employ an additional 200 people during construction and 122 during operation (above the existing 320 Stage 1 employees).

This project would be operated in conjunction with the Stage 1 project, and together the two projects would form a single, integrated mining complex with a range of shared infrastructure.

To allow this integration, consequential modifications to the Stage 1 project approval (MOD 3) are required to allow the Stage 1 infrastructure to receive, handle, process, store and load coal received from the Stage 2 mining operations and to extend the extend the operational life of the approved Stage 1 infrastructure to match the time frame for mining at the Stage 2 project (ie. until 31 December 2037).

Despite the repeal of Part 3A of the EP&A Act, the Stage 2 project is classified as a "transitional Part 3A project" under the savings and transitional provisions under Schedule 6A of the Act. This means the assessment of the merits of the project will be completed under the provisions of the former Part 3A of the EP&A Act, and consequently requires approval from the Minister for Planning and Infrastructure. However, under the Minister's delegations, the Planning Assessment Commission (PAC) is required to determine the application as more than 25 of the public submissions objected to the project.

The Department made the Environmental Assessment (EA) publicly available from 18 March until 29 April 2009. The Department received a total of 177 submissions on the project, including 7 from public authorities, 15 from special interest groups and 155 from the general public (including 4 form letters). 51% of the submissions from the general public objected to the project objected to the project, 46% supported the project and 3% did not object but raised concerns.

In order to reduce the environmental impacts associated with the project, MCM made significant changes to the original proposal and prepared Preferred Project Report (PPR). The changes included retaining barriers/blocks of in-situ coal in a number of locations, avoiding realigning of the full length of

Murragamba Creek, relocating some surface facilities and replacing truck haulage with an overland conveyor. The changes result in the sterilisation of up to 7.73 Mt of ROM coal, which is worth anywhere between $580 and $970 million dollars (depending on the fluctuating value of the resource).

The Department made the PPR publicly available from 31 January 2012 until 24 February 2012. The Department received an additional 188 submissions on the PPR, including 10 from agencies, 26 from special interest groups and 152 from the general public (including 1 petition signed by 557 people). 90% of the submissions from the general public objected to the project, 2% supported the project and 8% did not object but raised concerns.

The Department has assessed the merits of the project and modification applications, EA, PPR, submissions, responses to submissions and the additional information provided by MCM, in accordance with the objects of the EP&A Act and the principles of ecologically sustainable development.

The key issues arising from the Department's assessment of the project relate to:

- the clearing of 1,534 hectares (ha) of land, including 123 ha of endangered ecological communities (EECs) and a range of habitat for threatened fauna species;
- potential moderate noise impacts to 5 rural residential properties;
- potential impacts on local and regional groundwater and surface water resources;
- increased traffic on the local road network; and
- direct impact on 148 known Aboriginal sites.

The Department is confident that these impacts can be adequately mitigated, managed, offset and/or compensated through implementation of a number of commitments made by MCM and conditions recommended by the Department, including:

- a significant biodiversity offset strategy totally approximately 4,066 ha of native vegetation, including 1,168 ha of EEC, to be conserved and protected in perpetuity, along with a rehabilitation strategy that would ultimately increase this area to 5,568 ha of conservation land;
- regeneration of an additional 1,531 ha of existing cleared and disturbed grasslands within the offset area;
- noise mitigation of moderately affected properties;
- implementation of a water management system to ensure zero discharge of contaminated water from the site;
- establishment of a comprehensive surface water and groundwater monitoring network on the site and surrounds;
- implementation of the Ulan Road Strategy; and
- conservation and in perpetuity protection of 94 Aboriginal heritage sites (including 10 highly significant sites) within 4 conservation areas surrounding the site.

In addition, the Department has recommended conditions requiring MCM to contribute approximately $1.5 million toward community enhancement works.

The Department acknowledges that the project represents a logical extension of the existing mining complex, and that it would make use of existing infrastructure and facilities. The Department also recognises the significance of the coal resource and the major economic and social benefits the project would provide for the Mudgee region and to NSW, including:

- 220 direct jobs during construction and 120 direct jobs during operation;
- $120 million in capital expenditure during construction, which with Stage 1 operations would generate additional regional production and consumption of $260 million;
- average annual revenue during operation of the complex of $780 million,
- $54 million to the state in tax revenues during construction; and
- $98 million to the Commonwealth Government in taxes and royalties during operation.

On balance, the Department considers that the project's benefits outweigh its potential impacts and it therefore in the public interest, and should be approved subject to the recommended conditions of approval.

1. BACKGROUND

The Moolarben Coal Mine (Moolarben) is located 40 kilometres northeast of Mudgee in the Mid-Western local government area (see **Figure 1**). It was approved by the Minister in 2007, and started operating in 2010.

Together with the Ulan and Wilpinjong mines, it forms part of a large coal mining complex in the region that is currently allowed to extract up to 47 million tonnes of run-of-mine (ROM) coal a year, process it at existing coal handling and preparation plants, and export it to domestic and export markets via the Gulgong to Sandy Hollow Railway line.

Figure 1: *Regional Context*

The approved operations at each of the three mines is summarised in **Table 1**.

Table 1: *Approved Ulan, Moolarben and Wilpinjong Mining Complex*

Aspect	Ulan	Moolarben	Wilpinjong
Company	Ulan Coal Mines Limited (UCML)	Moolarben Coal Mines Pty Ltd (MCM)	Wilpinjong Coal Pty Ltd (WCPL)
Operations	Commenced in the 1920s	Commenced in 2010	Commenced in 2006
Consent	MP08_0184 which expires in 2031	MP05_0117 which expires in 2028	MP05_0021 which expires in 2027
Remaining Life	19 years	16 years	15 years
Mining Reserves	240 Mt	130 Mt	250 Mt
Mining Areas	• 3 underground domains (Ulan No. 3, Ulan West and North 1) • 1 open cut pit Mining operations currently in the Ulan No. 3 and North 1 domains moving to the north and in the open cut pit moving to the west.	• 1 underground domain (UG4) • 3 open cut pits (OC1, OC2 and OC3) Mining operations currently in OC1 progressing to the north.	• 6 open cut pits (Pits 1-6). Mining operations currently in Pits 1 and 2 (moving south), Pit 4 (moving east) and Pit 5 (moving north and south).
Extraction Rate	Approved: 20 Mtpa ROM coal Actual in 2010/2011: 4.5 Mt	Approved: 12 Mtpa ROM coal Actual in 2011: 7 Mt	Approved: 15Mtpa ROM coal Actual in 2011: 12.6 Mt
Coal Processing	At the mine's CHPP which can process up 24.1 Mt of ROM coal a year.	At the mine's CHPP which can process up 17 Mt of ROM coal a year.	At the mine's CHPP which can process up 12.5 Mt of ROM coal a year.
Overburden	Emplaced in pit within voids left by previous open cut mining.	Initially used to form environmental bunds then emplaced in pit within voids left by open cut mining.	Emplaced in pit within voids left by open cut mining.
Rejects Disposal	In-pit emplacement.	In-pit emplacement.	In-pit emplacement.
Water Balance	Water surpluses [maximum of 19.8 mega litres (ML)/day] managed via the Bobadeen Water Treatment Facility (WTF), Bobadeen Water Irrigation Scheme, Rowans Dam WTF, Ulan West WTF and water sharing with Moolarben.	Water deficit (maximum of 6.8ML/day) sourced from surface water runoff, groundwater inflows into the mining areas, groundwater extraction from the UG4 borefield and via a water sharing with Ulan.	Water deficit (maximum of 6.2 ML/day) sourced from surface water runoff, groundwater inflows into the open cut pits, advanced dewatering and groundwater extraction from the borefield. Surplus water following rainfall events (maximum of 4.5ML/day) is treated and discharged via a reverse osmosis plant.
Coal Transport	Maximum of 10 trains per day on the Gulgong to Sandy-Hollow Railway.	Approximately 4 trains per day on the Gulgong to Sandy-Hollow Railway.	Maximum of 10 trains per day on the Gulgong to Sandy-Hollow Railway.
Biodiversity Offsets	1,614 hectares (ha) of native vegetation, 69 ha of endangered ecological community (EEC) and 13 km of cliffs. 413 ha of these lands are to be re-established or improved with significant and/or threatened plant species and EEC.	1,282 ha of native vegetation and 144 ha of EEC. In addition, 153 ha of disturbed lands are to be regenerated with native vegetation and 48 ha of cleared land is to be regenerated with EEC.	480 ha within enhancement and conservation areas and 350 ha in regeneration areas.
Rehabilitation	Rehabilitate 408 ha of land to woodland vegetation.	Rehabilitate 370 ha of land to woodland and 580 ha of land to grassland.	Rehabilitate 850 ha of land to woodland and 1,070 ha of land to woodland/pasture.
Employment	931	320	333

This is now one of the most significant mining complexes outside the Hunter Valley, and in some ways is a logical expansion of the operations in the Hunter Valley.

As a consequence of the rapid growth of mining in the region over the last decade, most of the land in the vicinity of the complex is owned by one of the three mining companies (see **Figure 2**). This includes the land in the Ulan Village, where there is only one privately-owned residence remaining, and the Wollar Village, where there are only 9 privately-owned residences remaining.

While population densities are generally low in the areas surrounding the mining complex, there are still several privately-owned rural-residential properties in these areas. Most of these properties are used for some form of agriculture, primarily grazing, although some properties also offer tourist accommodation, as they are in close proximity to the vineyards in Mudgee, and the conservation areas in the region, such as the Goulburn River National Park.

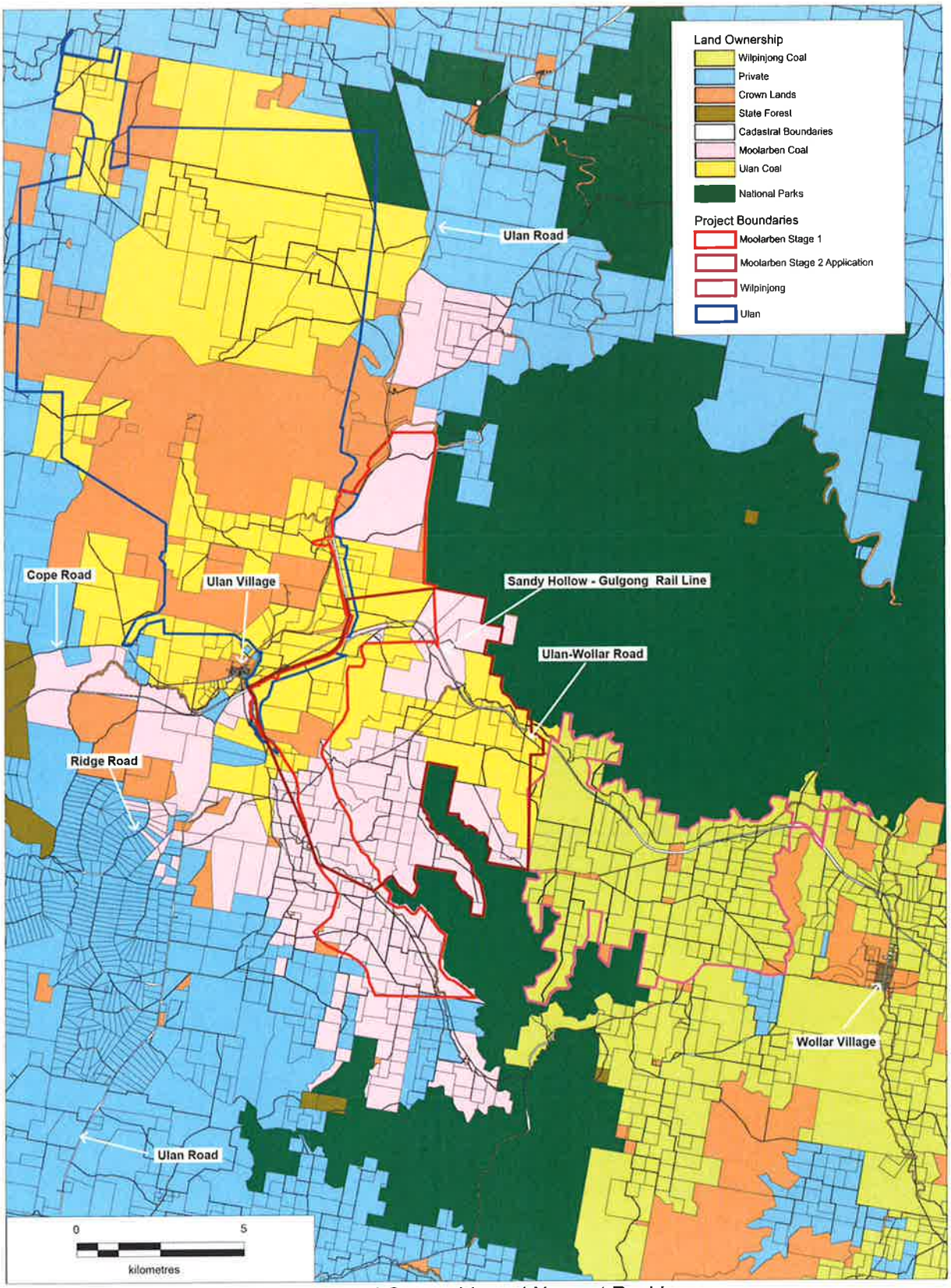


Figure 2: *Land Ownership and Nearest Residences*

The closest "cluster" of private residences to the mining complex is located along Ridge Road, to the south of the Ulan mine and west of the Moolarben mine (see **Figure 2**). The largest population centres in the region are Mudgee and Gulgong (see **Figure 1**), both of which are located some way from the mining complex.

Large tracts of land surrounding the mining complex contain high quality native vegetation and have significant regional conservation values. This includes the Goulburn River National Park, Munghorn Gap Nature Reserve, Durridgere State Forest and Curryall State Conservation Area (see **Figure 1**), as well as the nearly 4,000 hectares of land that has been set aside as biodiversity offsets for the three mines.

The mining complex is predominantly located in the Goulburn River catchment, which drains to the east and eventually to the Hunter River. However, the western portion of Ulan is separated by the Great Dividing Range and drains to the Talbragar River in the west and eventually into the Murrary-Darling Basin. Most of the tributaries on the mine sites are ephemeral.

Key infrastructure in the area includes:

- Ulan, Cope, Ulan-Wollar and Wollar Roads;
- the Gulgong to Sandy Hollow Railway line; and
- a 330kV transmission line that forms part of the regional electricity distribution network.

Existing Moolarben Stage 1 Project

The Moolarben Coal Mine is owned and operated by Moolarben Coal Mines Pty Limited (MCM), a joint venture comprising YanCoal Australia Pty Ltd (80%), Kores Australia Moolarben Coal Pty Ltd (10%), and Sojitz Moolarben Resources Pty Ltd (10%).

Stage 1 of the mine was approved by the NSW Minister for Planning on 6 September 2007 under the former Part 3A of the *Environmental Planning & Assessment Act 1979* (EP&A Act), following an Independent Hearing and Assessment Panel (IHAP).

This project approval has subsequently been modified on eight occasions, and currently allows MCM to extract up to 12 Mtpa of ROM coal from 3 open cut pits (OC1, OC2 and OC3) and one underground mining domain (UG4).

The general layout of the approved Stage 1 operations is shown in **Figure 3**.

To date, MCM has constructed the surface infrastructure of the mine and is close to completing mining operations in Open Cut 1 (see **Figure 3**). However, MCM is yet to commence any of the approved underground mining operations.

Figure 3: *Moolarben Coal Mine – Stage 1 Layout*

2. PROPOSED PROJECT

Moolarben Coal Mine Stage 2 Project

MCM is proposing to expand its mining operations further to the east, and develop two additional underground mining domains (UG1 and UG2) and one additional large open cut mining pit (OC4).

The proposal – known as the Moolarben Coal Mine Stage 2 Project – involves the extraction of an additional 16 Mt of ROM coal per year for a period of 24 years. The major components of the project are summarised in **Table 2** and depicted in **Figures 4**, **5**, **6** and **7**.

This project would be operated in conjunction with the Stage 1 project, and together the two projects would form a single, integrated mining complex with a range of shared infrastructure, including the existing coal handling and preparation plant and rail facilities.

Table 2: *Major Components of the Moolarben Stage 2 Preferred Project*

Aspect	*Description*
Project Summary	• **Extract up to 12 Mtpa of coal from 1 open cut pit (OC4) and up to 4 Mtpa of coal from 2 underground mining domains (UG1 and UG2) over a period of 24 years;** • **Construct a range of associated infrastructure including ROM coal facilities (rejects bin, hopper, stockpiles and a crusher), surface conveyors, support facilities and utilities;** • **Transfer of coal from OC4 to the Stage 2 ROM coal facility and coal from UG1 and UG2 to the existing Stage 1 ROM coal facility; and** • **Disposing of all coal rejects at the mine and rehabilitating the site.**
Disturbance Area	• 1,534 ha
Mining and Reserves	• Coal reserve of approximately 252 Mt; • Open cut mining using trucks, excavators and blasting to remove overburden and coal; and • Underground mining using longwall mining methods.
Coal Extraction	• Up to 16 Mtpa ROM coal.
Project Life	24 years (to December 2037), in general accordance with the following sequence: • OC4 – years 1 to 24 (operated concurrently with Stage 1 open cut mines); • UG1 – years 5 to 14; and • UG2 – years 10 to 17.
Proposed Surface Infrastructure	• ROM coal facility including coal stockpiles, conveyors and a crushing and sizing facility; • Offices, bathhouses, workshops and fuel storages; and • Network of internal roads.
Water Demand and Supply	• Water surplus in initial years (ie. years 1-5) of 174 ML/annum are predicted under average climatic conditions. Surpluses will be controlled by reducing pump from the Northern Borefield and by designing the water management system to contain runoff during high rainfall events; • Water deficits of 599 ML/annum in the remainder of the operating years are predicted under average climatic conditions. Deficits are intended to be met by accessing additional water from Ulan under a modified Water Sharing Agreement.
Overburden Emplacement	Overburden from OC4 will be emplaced in an out-of-pit emplacement area to the north of the OC4 pit.
Coarse Reject, Tailings Management	Generation of 2 Mtpa of coarse reject and tailings, which will be transferred via conveyor to OC4 for co-disposal with overburden in the pit void.
Mine Access	Main site access for employees, contractors, administration personnel and CHPP workers will be via the existing entry point on Ulan-Cassilis Road. New site access for employees to access the Stage 2 surface facilities will be via Ulan-Wollar Road.
Employment	Construction workforce of 220 employees and operational workforce of 122 employees.
Hours of Operation	24 hours a day, 7 days a week.
Biodiversity Offset	The project would result in the clearing of 1,534 ha of land, of which 632 ha is grassland and 902 ha is native woodland (including 123 ha of EEC). The biodiversity offset strategy proposed to compensate for this loss includes a total of 4,066 ha of land (including 1,168 ha of EEC) within 8 biodiversity offset areas.
Rehabilitation, Final landform and End Land Use	The 1,534 ha of land that would be cleared will be rehabilitated, including rehabilitating the 632 ha of existing degraded secondary grassland and shrublands to native open woodland and EEC communities. The rehabilitated land will be protected for in perpetuity conservation after mining.
Community Contributions	1.5 million
Capital Investment Value	120 million

Figure 4: *Stage 2 Mine Layout*

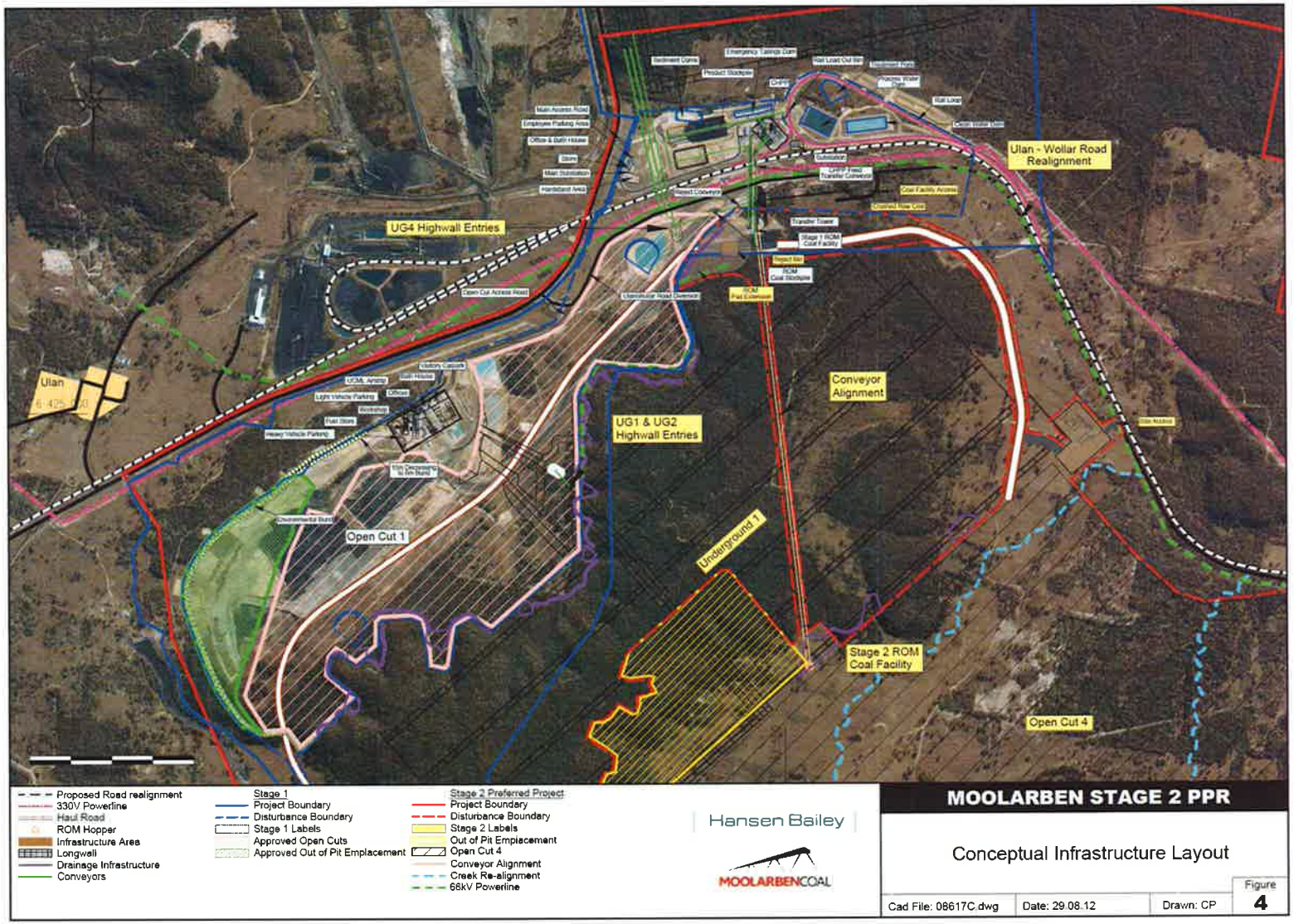


Figure 5: *Main Infrastructure Components*

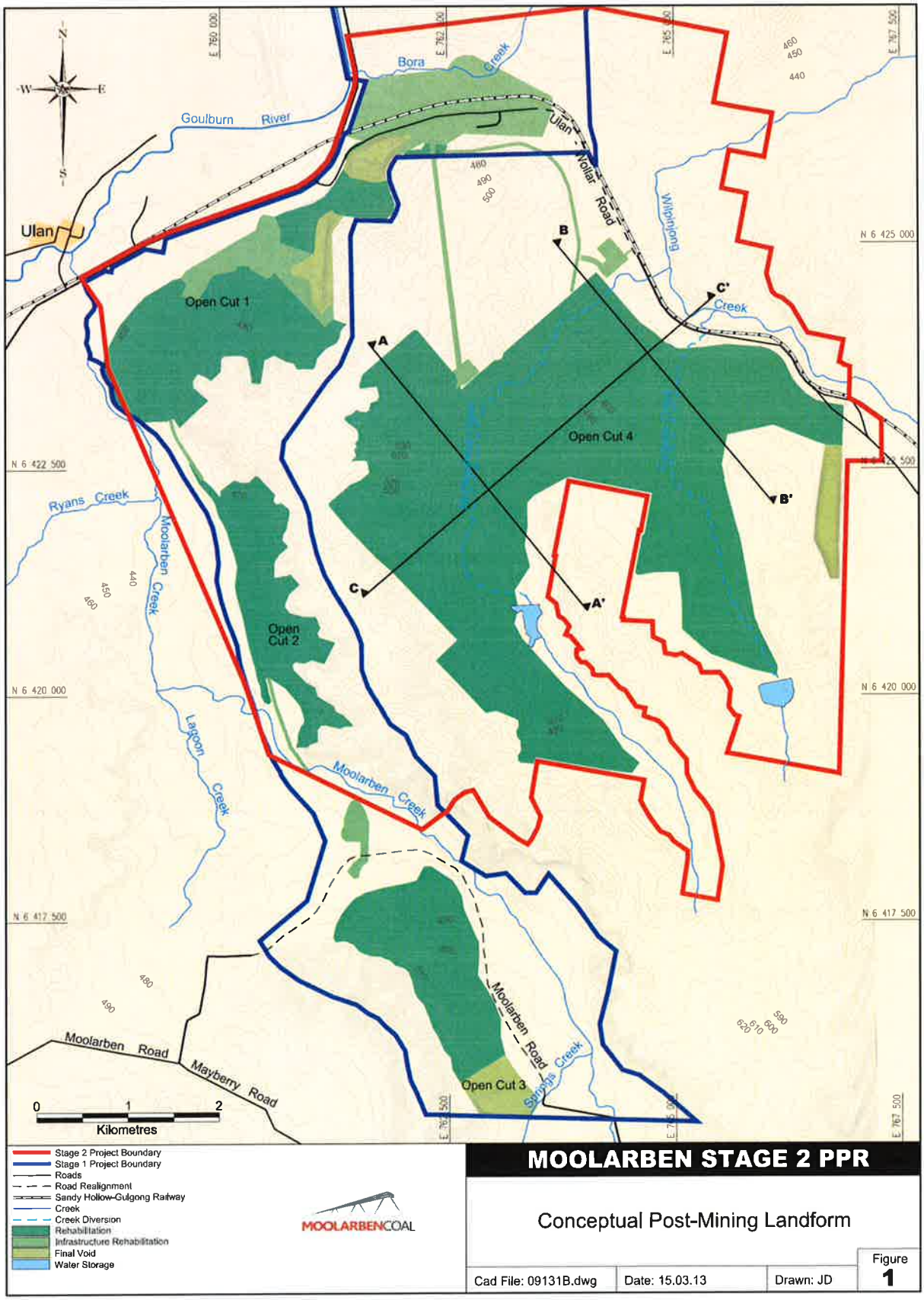


Figure 6: *Moolarben Stage 2 Final Landform*

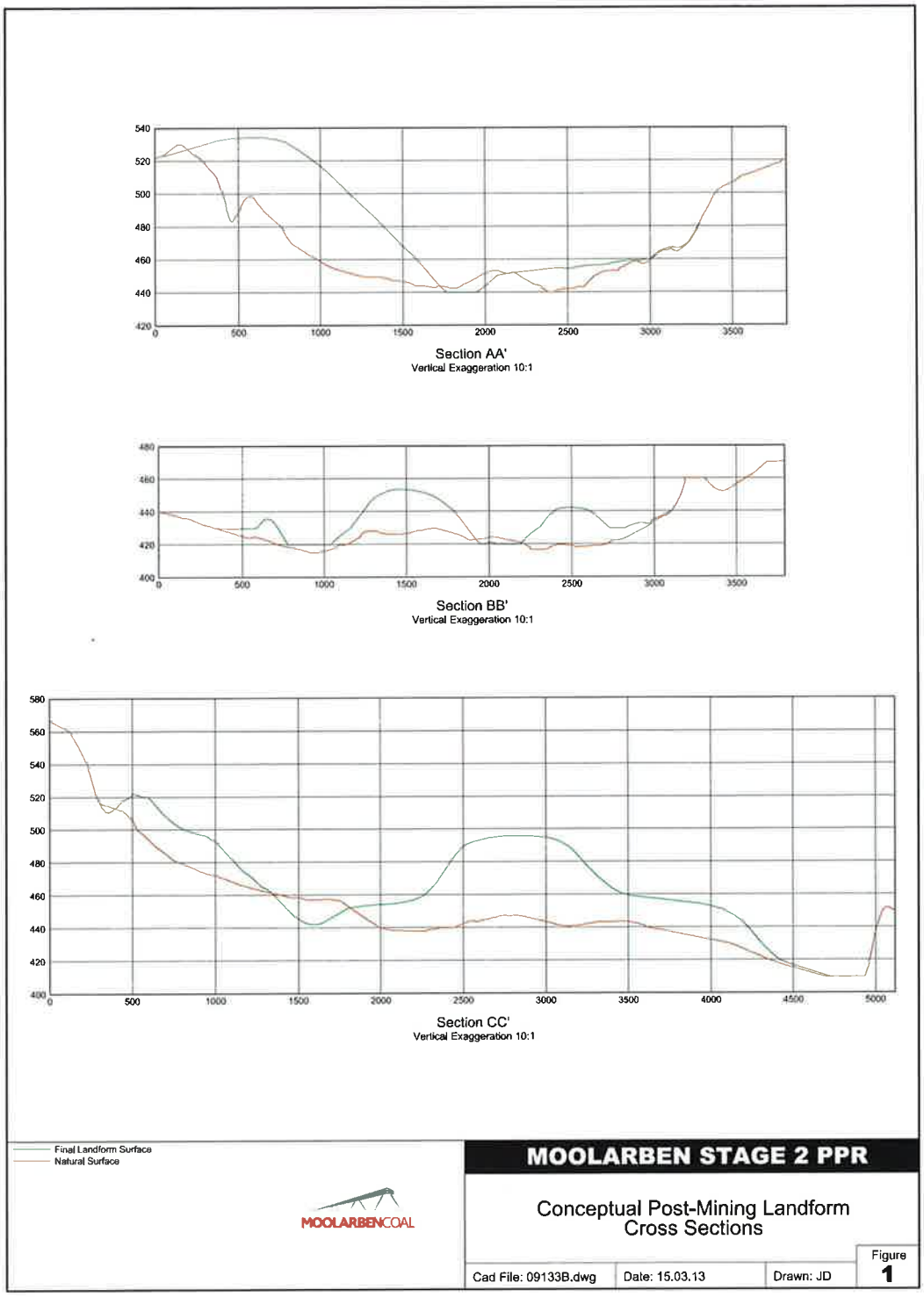


Figure 7: *Conceptual Post-Mining Landform Cross sections*

The original Stage 2 project was described in detail in the environmental assessment (EA) (see **Appendix A**) that was submitted in support of the project application, and exhibited in 2009. However, MCM subsequently made significant changes to the original project, which were outlined in the Preferred Project Report (PPR) for the project (see **Appendix B**).

The key changes are shown in orange on **Figure 8** and include:

- changes to the disturbance footprint and open cut mining sequence (including the relocation of out-of-pit emplacement areas) to avoid significant areas of EEC and numerous Aboriginal heritage sites;
- a revised creek diversion design to avoid realigning a 2.7 kilometre (km) section of Murragamba Creek, which has been identified as morphologically stable and containing significant ecological and archaeological values;
- relocating the Stage 2 ROM coal facilities to adjacent to the OC4 and replacing the proposed truck haulage of open cut coal with a dedicated overland conveyor to reduce noise, dust and greenhouse gas emissions; and
- relocating the Stage 2 surface facilities and site access to the northern end of OC4 to achieve operational efficiencies and aid in mine safety.

The Department's assessment is based on the revised project as described in the PPR.

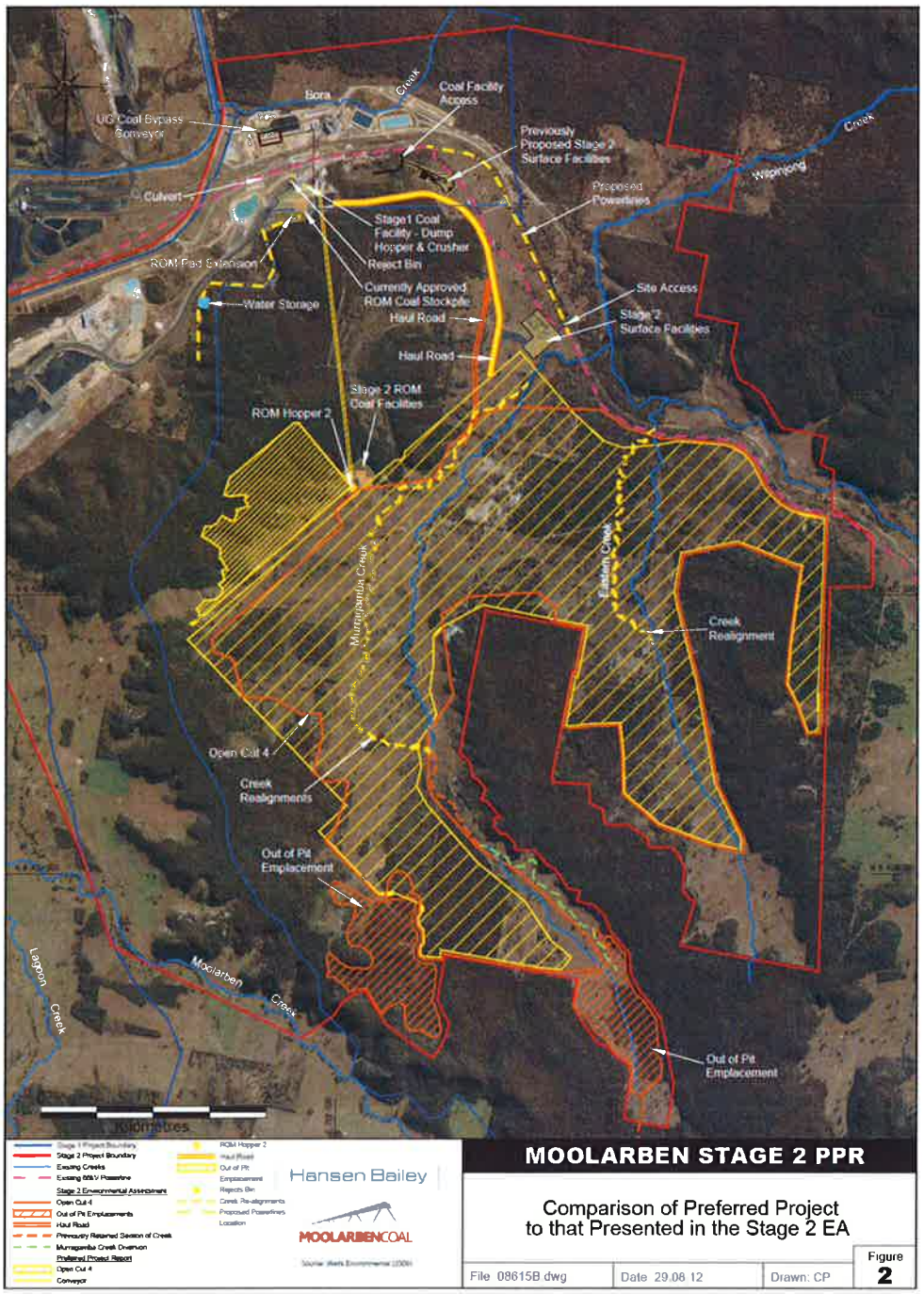


Figure 8: *Comparison of Changes to the General Arrangement of the Project as Exhibited in the EA and the Preferred Project*

Associated Moolarben Coal Mine Stage 1 Modification (MOD 3)
The Stage 2 project requires consequential modifications to the Stage 1 project approval.

These modifications, which are summarised in **Table 3** below, would allow MCM to:
- use the approved Stage 1 infrastructure to receive, handle, process, store and load coal received from the Stage 2 mining operations; and
- extend the operational life of the approved Stage 1 infrastructure to match the time frame for mining at the Stage 2 project (ie. until 31 December 2037).

Table 3: *Comparison of Approved (as modified) and Proposed Modified Moolarben Coal Mine Stage 1*

Aspect	*Approved (as modified) Stage 1 Project*	*Proposed Modified Stage 1 Project*
Mining Method	• 3 small open cut mines (OC1, 2 & 3) • 1 underground mine (UG4)	• No change
Reserves	• 127 Mt	• No change
Extraction Rate	• 12 Mtpa	• No change
Receipt of Coal	• 8 Mtpa from OC1, 2 & 3 • 4 Mtpa from UG4	• 13 Mtpa from OC1, 2, 3 & 4 • 4 Mtpa from UG1, 2 & 4
Coal processing	• Up to 10 Mtpa	• Up to 17 Mtpa
Product Coal Transport	• Up to 4 trains per day via rail spur and loop which is connected to the Gulgong to Sandy-Hollow Railway	• Up to 5 trains per day via rail spur and loop which is connected to the Gulgong to Sandy-Hollow Railway
Project Life	• To 2028	• To 2037
Disturbance Area	• 2,100 ha	• No change
Surface Infrastructure	• Main office, car park and bath house; • ROM coal facility; • CHPP, conveyor, product stockpile areas, coal loader, rail loop and spur; • environmental bunds; • OC1 Surface facilities including office, car park, workshop, bath house and fuel storage; • Access roads; and • Water management infrastructure.	• No change
Employment	• 320	• No change
Hours of Operation	• 24 hours a day, 7 days a week	• No change

The potential impacts associated with proposed modification were fully considered in both the EA and the PPR for the Stage 2 project. This assessment was based on the cumulative impacts of Stage 1 and 2 operating as an integrated mining complex.

The Department has assessed the potential impacts of the proposed modification along with those of the Stage 2 project in this report.

Further Modification to the Stage 1 Project Approval (MOD 9)
In May 2013, Moolarben lodged an application (MOD 9) with the Department seeking a further modification to its Stage 1 project approval.

This modification involves an extension of mining within Open Cuts 1 and 2, the construction and operation of additional water management infrastructure, minor changes to the rehabilitation and final landform of the mine, and an extension of the project life by 9 years to 2037.

The Department has completed its assessment of this proposal in conjunction with its completion of its assessment of the Stage 2 project, and fully considered the potential cumulative impacts of both of these proposals in this report. In doing this, the Department has assumed that the application for MOD 9 would be determined prior to any determination of the Stage 2 or MOD 3 applications, and has adjusted many of its recommendations accordingly.

3. STATUTORY CONTEXT

3.1 Moolarben Coal Mine Stage 2 Project

Major Project
Despite the repeal of Part 3A of the EP&A Act, the project is classified as a "transitional Part 3A project" under the savings and transitional provisions under Schedule 6A of the Act. This means the assessment of the merits of the project will be completed under the provisions of the former Part 3A of the EP&A Act.

The Minister for Planning and Infrastructure is the approval authority for the project application. However, the application falls within the terms of the Minister's delegation of 14 September 2011 as more than 25 of the public submissions objected to the project. Consequently, the Planning Assessment Commission (PAC) is required to determine the application.

Permissibility
Under the *Mid-Western Regional Interim Local Environmental Plan 2008*, the land on site is zoned for Agriculture and Conservation.

Under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (Mining SEPP), the project is permissible with development consent in both of these zones.

Consequently, the Minister may approve the carrying out of the project.

Integrated Approvals
Under section 75U of the EP&A Act, a number of other approvals have been integrated into the major project approval process and are not required to be separately obtained for the project. These include:

- heritage-related approvals under the *Heritage Act 1977* and *National Parks and Wildlife Act 1974*; and
- some water-related approvals under the *Water Management Act 2000*.

Under section 75V of the Act, a number of further approvals are required to be obtained, but these must be approved in a manner that is consistent with any Part 3A approval for the project. These include:

- a mining lease under the *Mining Act 1992*;
- an Environment Protection Licence (EPL) under the *Protection of the Environment Operations Act 1997*; and
- consent under the *Roads Act 1993* to undertake works within a road reserve.

The Department has consulted with the relevant Government authorities responsible for these other approvals (see Section 4) and has considered the issues relating to these approvals in its assessment of the Project (see Section 5). None of these authorities object to the project on grounds related to these other approvals subject to the imposition of suitable conditions.

Other Approvals
MCM needs to obtain several other approvals for the project, which are not integrated into the Part 3A approval process, including:

- an approval from the Commonwealth Minister for Sustainability, Environment, Water, Population, Communities under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) because the Project is a "controlled action" as it is likely to have a significant impact on listed migratory species (Regent Honeyeater and Swift Parrot); threatened communities (White Box Yellow Box Blakely's Redgum Woodland); derived grasslands Critically Endangered Ecological Community; and the Large-eared Pied Bat, Greater Long-eared Bat, Brushtailed Rock Wallaby and Spotted-tailed Quoll;
- an approval from Council for the closure of two local roads (Carrs Gap and Murragamba Creek Roads) under the *Roads Act 1993*; and
- Water licences from the NSW Office of Water (NOW) under both the *Water Act 1912* and the *Water Management Act 2000*.

The Commonwealth has accredited the Part 3A approval process for the project. This means the assessment of both State and Commonwealth matters has been integrated into a single assessment process for the project. Nevertheless, it is important to recognise that the Commonwealth maintains an independent approval role for the Project, and is likely to determine the matter following the PAC's determination.

The Department has consulted with the relevant Government authorities responsible for these other approvals (see Section 4), and has considered the issues relating to these approvals in its assessment of the Project (see Section 5). None of these authorities object to the project on grounds related to these other approvals subject to the imposition of suitable conditions.

3.2 Moolarben Coal Mine Stage 1 Modification (MOD 3)

Legislative Framework
Although Part 3A of the EP&A Act has been repealed, the project approval for Stage 1 of the Moolarben Coal Project remains a "transitional Part 3A project" under Schedule 6A of the Act. This means that the project approval will continue to be modified under the provisions of the former Section 75W of the EP&A Act.

The Department is satisfied that the proposed modifications to the Stage 1 project approval facilitate the development of the Stage 2 project and can be characterised as modifications to the currently approved project, and consequently fall within the scope of Section 75W.

In this regard, the Department notes the proposed modifications:
- would not cause any additional surface disturbance;
- would result in a moderate increase in the annual coal processing rates on site and life of the mine, and a negligible increase in rail movements; and
- would not significantly increase the environmental impacts of the project.

Approval Authority
The Minister approved the application for Stage 1 of the Moolarben Coal Project, and is consequently the approval authority for the modification application (MOD 3) associated with the Stage 2 project. This application also falls within the terms of the Minister's delegation of 14 September 2011, as more than 25 of the public submissions objected to the proposal, and must therefore be determined by the PAC.

3.3 PAC Review

On 6 December 2013, the Minister asked the PAC to carry out an independent review of the project with public hearings.

The terms of reference for this review, require the PAC to:
- consider the Department's preliminary assessment of the merits of both applications for Stage 2 of the Moolarben Coal Project, including the EA and PPR for the project, submissions, the response to submissions, and any other relevant information provided to the Department during the assessment process or the PAC during the review process;
- review the merits of Stage 2 of the Moolarben Coal Project, paying particular attention to the potential biodiversity impacts of the project;
- hold public hearings during the review as soon as practicable after receiving the Department's preliminary assessment of the project; and
- submit its final report on the review to the Department within one month of holding the public hearings, unless the Director-General of the Department agrees otherwise.

The formal review will commence once the Department delivers its preliminary assessment of the merits of the project to the PAC.

Once the PAC has completed its review, the Department will consider the findings and recommendations of the PAC review and complete its assessment of the merits of the project. It will then refer both applications back to the PAC for determination.

3.4 Environmental Planning Instruments

Under Section 75I of the EP&A Act, the Director-General's report is required to include a copy of, or reference to, the provisions of environmental planning instruments (EPIs) that substantially govern the carrying out of the project.

A consideration of the relevant EPIs was provided in the EA and has been further considered by the Department (**Appendix C**). The Department is satisfied that MCM has adequately considered the requirements of applicable EPIs as part of the assessment of the project and that none of these instruments substantially govern the carrying out of the project.

The Mining SEPP was recently modified to require consent authorities to consider the significance of the resource when considering the merits any mining proposal, as well as the economic benefits to the State and region of any such proposal.

While these provisions of the Mining SEPP do not strictly apply to either the project application for the Stage 2 project nor the associated modification application (because they are transitional Part 3A projects), consistent with longstanding practice the Department has considered these matters fully in its assessment of the merits of both proposals.

This assessment has concluded that:

- the Stage 2 coal resource is extremely significant based on:
  - its large size (around 250 Mt);
  - its strategic location in the middle of one of the biggest mining complexes in the State outside the Hunter Valley;
  - the relationship of the resource to the existing Stage 1 project, and the synergies this presents for sharing infrastructure and reducing the capital costs associated with extracting the resource;
  - the proximity of the resource to key regional infrastructure, such as Ulan Road and the Gulgong to Sandy Hollow Railway line; and
  - the potential for the project to provide coal to domestic power stations NSW; and
- the project will generate substantial economic benefits for both the State and the region by creating direct employment for at least 120 employees, attracting capital investment of around $120 million in the Mid-Western local government area, and generating significant royalties for the State Government.

3.5 Objects of the Environmental Planning and Assessment Act 1979

Decision-makers should consider the objects of the EP&A Act when making decisions under the Act. These objects are detailed in section 5 of the Act, and include:

'The objects of this Act are:

(a) to encourage:

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

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

...

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

(vii) ecologically sustainable development (ESD)'

The Department is satisfied that the Project encourages the proper use of resources (Object 5(a)(i)) and the promotion of orderly and economic use of land (Object 5(a)(ii)).

The encouragement of environmental protection (Object 5(a)(i)) is considered in detail in Section 5 of this report. Based on this consideration, the Department is satisfied that the impacts of the Project can be mitigated and/or managed to ensure an acceptable level of environmental performance.

Finally, the Department has fully considered the encouragement of ecologically sustainable development (ESD) (Object 5(a)(vii)) throughout its assessment of the merits of the Project application, and sought to integrate all significant economic and environmental considerations and avoid any serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences. Based on this consideration, the Department is satisfied that the Project can be carried out in a manner that is consistent with the principles of ESD.

3.6 Statement of Compliance

Under section 75I of the EP&A Act, the Director-General's report is required to include a statement relating to compliance with the Director-General's environmental assessment requirements issued with respect to the project. The Department is satisfied that the environmental assessment requirements have been complied with.

4. CONSULTATION

In accordance with section 75H(3) of the EP&A Act, the Department:

- made the EA publicly available from 18 March until 29 April 2009:
  - on the Department's website;
  - at the Department's Information Centre, Council's office and at the office of the Nature Conservation Council;
  - at the Moolarben Coal Mine site office;
- notified relevant State Government authorities and Council by letter; and
- advertised the exhibition in local media.

During the exhibition of the EA, the Department received a total of 177 submissions on the project, including:

- 7 from public authorities;
- 15 from special interest groups; and
- 155 from the general public, including 4 form letters.

After MCM made significant changes, the Department:

- made the PPR publicly available from 31 January 2012 until 24 February 2012:
  - on the Department's website;
  - at the Department's Information Centre, Council's office and at the office of the Nature Conservation Council;
  - at the Moolarben Coal Mine site office;
- notified relevant State Government authorities and Council by letter; and
- advertised the exhibition in local media.

During the exhibition of the PPR, the Department received an additional 188 submissions, including:

- 10 from agencies;
- 26 from special interest groups; and
- 152 from the general public, including 1 petition signed by 557 people.

A copy of all submissions received in response to the exhibition of the EA and the PPR are attached as **Appendix D**.

Of the 177 submissions received during exhibition of the EA, 51% objected to the project, 46% supported the project and 3% did not object to the project but raised concerns about its potential impacts. Of the 188 submissions received during exhibition of the PPR, 90% objected to the project, 2% supported the project and 8% raised concerns.

4.1 Key Issues Raised

Key issues raised in submissions from objectors during the exhibition of the EA were in relation to greenhouse gas and climate change and potential impacts of the proposal on water resources. Submissions in support of the project generally cited employment and socio-economic benefits as key reasons why the project should be approved.

Key issues raised in submissions from objectors during the exhibition of the PPR were in relation to "the Drip" and "Corner Gorges", impacts on flora and fauna (including issues associated with the biodiversity offset) and impacts on water resources.

The number of times each issue was raised in submissions on both the EA and the PPR are shown in **Figure 9**.

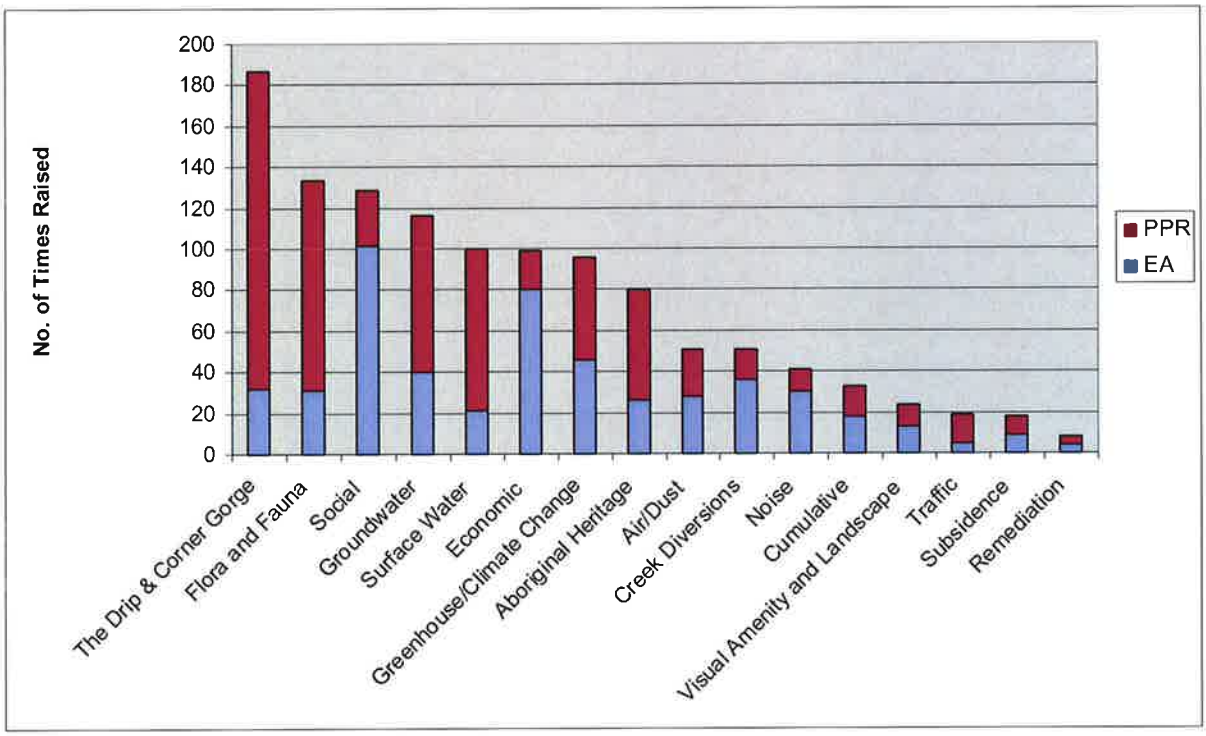


Figure 9: *Key Issues for Special Interest Groups and the Community*

4.2 Responses to Submissions

MCM provided formal response to the issues raised in submissions (RTS) on both the EA and PPR in July 2009, September 2009, January 2010 and June 2012 (see **Appendix E**).

The RTS on the PPR addresses the issues raised in submissions, and includes a significant amount of additional information, including:

- supplementary information and mapping of the biodiversity offset areas undertaken by Cumberland Ecology Pty Ltd (Cumberland);
- supplementary sediment and erosion control information, including the capacity and location of proposed clean and dirty water systems;
- a Baseline Surface Water Run-off Assessment undertaken by Worley Parsons Services Pty Ltd (Worley Parsons); and
- an additional Groundwater Impact Assessment undertaken by RPS Aquaterra Pty Ltd (Aquaterra) which provides further details of the potential groundwater impacts from Stage 2 operations in isolation.

The Department made all these reports publically available on its website. In addition, the Department sought further comments on these reports from all affected Government agencies, key community members and special interest groups.

Additional comments outlining residual concerns were received from the **Department of Environment** (formerly the Department of Sustainability, Environment, Water Populations and the Community), the **Environment Protection Authority** (EPA), the **Office of Environment & Heritage** (OEH), the **NSW Office of Water** (NOW), **Mid-Western Regional Council** (Council), one private landowner and Ulan Coal (**Appendix D**).

The **Central West Catchment Management Authority** (CWCMA), **Division of Resources and Energy** (DRE, within the Department of Trade and Investment, Regional Infrastructure and Services), **Roads and Maritime Service** (RMS), **Crown Lands** and **NSW Fisheries** raised no additional concerns in relation to the proposal.

In August 2012, at the request of the Department, MCM provided an addendum to its RTS on the PPR (titled PPR Residual Matters Report – see **Appendix F**), which provided a range of additional information to address key residual issues raised by the agencies.

Since this time, the Department has consulted further with MCM and several public authorities during the finalisation of the preliminary assessment of the merits of the project.

Again at the request of the Department, this resulted in MCM providing a range of additional information including a:

- Goundwater Accounting and Water Sharing Plan prepared by Aquaterra to provide further details on predicted groundwater use, associated water licencing requirements and relevance of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009* (WSP) rules;
- range of surface water information prepared by Worley Parsons, including updated baseline hydrological data, specific water management system requirements and results of more comprehensive water balance modelling for the overall project as well as the final void; and
- final Biodiversity Offsetting Strategy; and
- Water Licencing Report prepared by Dundon Consulting Pty Ltd.

The Residual Matters Report and additional information provided to the Department during the assessment process is included in **Appendix F**.

This information was subsequently sent to other relevant agencies (including NOW and OEH) for final comments. Copies of these final comments are also included in **Appendix D**.

4.3 Residual Concerns in Agency Submissions

Biodiversity Impacts and Offset

Council raised a number of concerns about the original biodiversity offset for the project, including that the offset:

- would not conserve the area known as "the Drip" and the "Corner Gorges";
- would not provide "like for like" compensation for the vegetation clearing; and
- would reduce its rateable income, result in the loss of agricultural land, and cause weed and pest control problems in the region.

In relation to "the Drip" and the "Corner Gorge", MCM has confirmed that in order to satisfy commitments made as part of the Stage 1 project, it has commenced the formal Reserve Referral Process under the *National Parks and Wildlife Act, 1974* for incorporation of these areas, as well as adjacent Crown Lands, into the Goulburn River National Park. OEH has confirmed that it is currently negotiating with MCM and other relevant government agencies to determine the most appropriate conservation mechanism for this area.

To address concerns in relation to "like for like" compensation, MCM provided a significantly revised biodiversity offset package, which includes three additional offset areas and commitments to regenerate large tracts of existing disturbed grasslands to woodland communities. As discussed in detail in Section 5.6, the Department is satisfied that this would result in the establishment of similar vegetation communities in the medium to long term.

The Department notes Council's claims that mining-related biodiversity offsets within the Mid-western regional area are resulting in a reduction in its rateable income, weed and pest control issues and loss of agricultural land. However, preliminary analysis suggests that mining-related offsets cover a very

small proportion of the land in the LGA (about 0.5 % of land), and that none of offsets contain prime agricultural land. They generally contain areas of existing native vegetation or grazing lands that are required to be regenerated.

OEH indicated that it has residual concerns regarding the ability of the offset program to adequately compensate for the impact to woodland birds, in particular the critically endangered Regent Honeyeater. To address these concerns, OEH recommended that MCM consider implementing supplementary measures to reduce the immediate impact on woodland birds, and suggested that this be in the form of support to the National Regent Honeyeater Recovery Team within OEH. MCM has provided a detailed response to this recommendation, arguing this is unnecessary (see **Appendix F**).

The response indicates that additional targeted ecological surveys at the offset properties, which were completed in 2013, have provided substantial information regarding threatened species in the offset areas, including the Regent Honeyeater (refer to **Appendix F**).

Specific outcomes of these surveys in relation to the Regent Honeyeater confirm that a total of 1,744 ha of regent Honeyeater habitat is present within the offset areas, compared with a conservative estimate of 685 ha of potential habitat in the Stage 2 disturbance area.

As discussed in more detail in Section 5.6 of this report, MCM has committed to regenerate grassland areas within the offset areas to woodland using species typical of the White Box Yellow Box Blakely's Red Gum Woodland EEC, which are recognised habitat for the Regent Honeyeater. MCM indicates that this will increase the area of habitat for the Regent Honeyeater that is conserved/created by an additional 1,160 ha, resulting in a total of 2,904 ha of habitat in the offset areas in the medium to long term.

Furthermore, MCM indicate that the potential area of Regent Honeyeater habitat would be further increased by commitments to revegetate 1,502 ha of the Stage 2 disturbance area to a mosaic of forest and woodland with species typical of the White Box Yellow Box Blakely's Red Gum Woodland EEC. This would result in a total of 4,406 ha of known and potential Regent Honeyeater habitat in the medium to long term, which MCM argues is more than adequate to compensate for potential impacts to this species as a result of the project.

The Department is satisfied that significant areas of habitat for the Regent Honeyeater existing in the offset areas, and has recommended conditions requiring the regeneration of vegetation within the offset areas to be focused on the re-establishment of flora species typical of EECs which are know habitat for the Regent Honeyeater.

Water Resources

NOW raised a number of concerns about the potential impact of the project on water resources, including:

- the volume of groundwater contained within the alluvial groundwater system likely to be intercepted and/or extracted by the project (including analysis of the extent and implications of a palaeochannel);
- the need to maintain flow regimes in Wilpinjong Creek and the Lower Wollar Creek system; and
- whether MCM would be able to acquire and hold adequate water access licences in the Wollar Creek Water Source to fully account for any predicted water take.

MCM subsequently undertook further groundwater modelling to predict the worst case water take from the Wollar Creek Water Source assuming a higher level of connectivity between the mine and the alluvial or palaeochannel aquifers than was previously modelled. This involved comparing the test results and the adopted model values with textbook ranges of hydraulic connectivity. Although MCM's hydraulic consultant believed that the resultant predictions for increased mine flows and baseflow reductions were highly improbable and unrealistic, it accepted that these predictions could be used to provide a worst case assessment of the impacts of the project, and to guide the preparation of any contingency measures.

In this regard, MCM agreed to expand its monitoring program and re-calibrate the groundwater model before any of these potential impacts would be realised (ie. prior to Years 9-10 of mining operations). As discussed in greater detail in Sections 5.4 and 5.5 of this report, if this work indicates that the groundwater take of the project is likely to be higher than predicted, then MCM would implement a

range of contingency measures, including purchasing additional licence allocations (above existing commitments) or implementing return flows to Wilpinjong Creek to ensure the flow regimes in the Wollar Creek Water Source are maintained. Both NOW and the Department are satisfied with this approach.

MCM also clarified its proposed approach to securing the necessary licences for the project, which includes converting an aquifer access licence to an unregulated river access licence to account for predicted creek baseflow reductions.

NOW has accepted that the conversion of aquifer access licences to unregulated river access licences within the Wollar Creek Water Source is lawful, but indicated that this process requires consideration of the:

- access *Licence Dealing Principles Order 2004*;
- information requirement of the *Aquifer Interference Policy*; and
- effect on any such conversion on basic landholder right users.

MCM subsequently provided the Department and NOW a report titled *Water Licensing – Wollar Creek Water Source* (dated 11 June 13), which provides detailed consideration of each of the issues listed.

In summary, the report indicated that the conversion would not:

- *increase extraction commitments above sustainable levels* - the proposed dealing will not increase the net take of water from the Wollar Creek Water Source and will therefore not increase extraction above the long-term average annual extraction limit that has been set for the Goulburn Extraction Management Unit;
- *result in adverse impacts on basic rights or other access licence users* – there are no private landholdings with river frontage to Wilpinjong Creek or that have access to a connected alluvial aquifer on Wilpinjong Creek. There are no other basic landholder rights users (including harvestable rights users, unregulated river users or bore users) within the Wollar Creek Water Source that would be affected by the conversion;
- *affect any high priority GDEs* – no high priority GDEs were identified in the HUAWSP for the Wollar Creek Water Source;
- *cause adverse water quality impacts* – the project would reduce the amount of saline water currently moving from the palaeochannel and underlying Permian coal formation aquifers to surface waters and connected alluvial aquifers, which should beneficially improve water quality in Wilpinjong Creek in the long term; and
- *adversely affect any areas of high conservation value, including areas of indigenous, cultural heritage or spiritual significance* – there are no registered geographical landforms or registered features of indigenous significance in the Wollar Creek Water Source. The Goulburn River National Park and Munghorn Gap Nature Reserve which form the headwaters to part of the Wollar Creek Water Source are upstream of the proposed mining and will not be impacted.

NOW has reviewed this information has accepted the licence conversion approach proposed by MCM. As discussed in greater detail in Section 5.5 of this report, MCM has indicated its intention to submit an application to NOW to convert 68 ML of its aquifer access licence to an unregulated river access licence to lawfully account for the predicted Stage 2 water take from the Wollar Creek Water Source.

The EPA noted that neither the EA nor PPR contained detailed information on the potential surface water discharges of the project, and recommended conditions requiring this information to be included in the Water Management Plan prior to the commencement of mining. However, MCM has subsequently indicated that it intends to operate the project as a nil discharge site. As discussed in detail in Section 5.5, the Department is satisfied that the project can be operated to meet this objective and has recommended conditions to reflect this requirement.

The EPA also recommended conditions requiring MCM to prepare a series of post-approval water related management plans. The Department has recommended conditions requiring MCM to prepare these plans prior to the commencement of construction.

Noise

In its submission, Council commented on a range of strategic and policy-related noise issues, including seeking a review of the basis for determining the noise criteria for mining activities under the *NSW Industrial Noise Policy* (INP). While the Department has noted these comments, it believes they

are not directly relevant to an assessment of the merits of the proposal and should be considered further in the forthcoming review of the NSW INP.

Council also requested the establishment of an independent regional noise monitoring network for the three Mudgee mines. As discussed in detail in Section 5.1, the Department does not believe that an independent network is warranted at this stage. Nevertheless, the Department has recommended conditions requiring Moolarben to carry out regular attended monitoring of the impacts of the project, and to work with the owners of both the Ulan and Wilpinjong mines to minimise any cumulative noise impacts.

Air Quality

The EPA initially recommended that MCM be required to demonstrate that it can achieve an 80% reduction in dust emissions from haul roads throughout the life of the project. Subsequent to this correspondence the EPA has advised the Department that the existing Stage 1 EPL has been varied to include a condition requiring MCM to achieve and maintain a dust control efficiency of 80% or more on all haul roads by July 2013. The EPL also includes a Pollution Reduction Program (PRP) titled *Coal Mine Particulate Matter Control Best Practice – Wheel Generated Dust,* requiring MCM to prepare and implement a comprehensive monitoring program to assess the dust control effectiveness on site. The EPA has indicated that this requirement will be extended to the Stage 2 project.

In addition, the EPA considered that MCM's commitment to regularly review dust and particulate matter emissions should be supported by ongoing site-specific monitoring, and recommended conditions that provided long and short term air quality criteria. The Department has incorporated these conditions into the recommended conditions of approval.

Aboriginal Heritage

OEH was generally satisfied with the level of assessment and consultation undertaken in relation to Aboriginal heritage. However, OEH recommended that two small areas that were not surveyed as part of the assessment be surveyed prior to the commencement of construction. The Department has recommended a condition to ensure this occurs.

OEH also recommended that MCM be required to carry out targeted field surveys in selected parts of the biodiversity offset areas. The Department has recommended a condition to ensure this occurs.

Transport

Council raised concerns about the increase in traffic on local roads, in particular Ulan Road.

The impact of cumulative mine-related traffic on Ulan Road (and associated traffic noise issues) has been raised as an issue during previous project applications for the three Mudgee mines.

To address this, the Department included a condition in both the Ulan and Wilpinjong project approvals requiring the mines, in conjunction with MCM, to prepare the Ulan Road Strategy (URS) to:

- identify *upgrade and maintenance works* necessary to ensure the condition and standard of Ulan Road and the associated intersections are suitable for the projected traffic impact over the life of the combined mining operations;
- calculate the *costs* and *appropriate contributions* toward the upgrade and maintenance works; and
- identify a *program* for upgrade and maintenance works.

The URS was finalised by specialist transport consultants, Arrb Group Ltd in December 2011. However, the Council and mines could not agree on the apportionment of costs for the implementation of the URS, and the matter was referred to the Director-General for resolution.

After a long dispute resolution process, which involved an independent review of the URS and extensive consultation with all parties, the Director-General endorsed a revised form of the URS, and determined the funding responsibilities for the implementation of the strategy. He also asked Council and the three mining companies to develop a binding commercial agreement for the delivery of the URS.

Although the development of this binding commercial agreement was delayed, principally due to Council's concerns about its ability to fund its share of the implementation of the strategy, the

Department understands that Council and the three mines are now working on the agreement now that Council has received extensive funding under the Resources for Regions program for the implementation of the URS. The Department has recommended a condition requiring MCM to participate in the development of this agreement, and to pay its share of the costs associated with implementing the URS.

MSC also expressed concern about the assumptions used in the traffic impact assessment for mine-related traffic on Bylong Valley Way and requested that the Department impose a condition prohibiting the use of that road by MCM mine-related traffic. Subsequent information provided by MCM indicates that a very small number of the existing (7 employees) and future (4 employees) workforce use this road. The Department therefore does not believe that it is necessary to prohibit mine-related traffic on this road.

Social

Council raised concerns in relation to local and regional socio-economic impacts associated with the increased number of employees in the area, including:

- short-term housing and rental availability;
- pressure on infrastructure and services, including roads, education, medical and childcare services;
- impacts to local businesses and employers due to increased wages being offered by the mining sector and the loss of local experienced workers to the mining sector.

On 22 March 2013, Council approved an application made by MCM to construct a temporary workers accommodation (TWA) in a location approximately 5 km to the north of the project. The TWA is designed to accommodate 300 workers during the initial Stage 2 construction operations. The Department is satisfied that the TWA will address the predicted short-term deficit in housing and rental accommodation associated with the Stage 2 project.

As discussed in detail in Section 5.9, the Department is satisfied that the majority of the additional demands can be addressed either by the State Government through the normal budgetary process, Council with some funding assistance from MCM (via a Voluntary Planning Agreement), or the private sector.

5. ASSESSMENT

In its assessment of the merits of both the project application and the modification application, the Department has considered the EA, PPR, submissions, responses to submissions and the additional information provided by the Proponent.

The Department has also considered the relevant statutory requirements during the assessment, including:

- objects of the EP&A Act, including ecologically sustainable development (ESD) (Section 3.5);
- relevant provisions of EPI's; and
- relevant technical guidelines.

In addition, the Department commissioned independent expert advice to assist with its assessment of the following aspects of the project:

- subsidence impacts (Dr Jim Galvin);
- groundwater impacts (Dr Frans Kalf);
- surface water impacts (Mr Lindsay Gilbert);
- biodiversity impacts (Dr David Robertson); and
- rehabilitation (Dr Mark Burns).

Copies of the expert review reports are attached at **Appendix G**.

The following provides a summary of the findings of this assessment.

5.1 Noise

Noise Assessments
MCM has commissioned several assessments of the potential noise impacts of the project (see Appendix 4 of the EA, Appendix D of the PPR, and Appendix C of the EA for the MOD 9 application, as well as the various response to issues raised in submissions).

Due to the integrated nature of the proposed mining operations, all of these assessments have modelled the potential impacts of the Moolarben Coal Project as a whole (in other words, the combined operations of Stage 1 and 2 of the project).

The Department supports this approach.

It should also be noted that temperature inversion conditions are common in the area during the winter evening period (occurring 41% of the time), and have therefore been incorporated into the worst case modelling predictions of all three assessments. However, low frequency noise is not expected to be a feature of the area, and so the modifying factors for such impacts under the INP have not been applied to any of the modelling results in these assessments.

After a detailed review of all of these assessments (see **Appendix E**), the Department believes the assessment for the MOD 9 applications represents the most up-to-date assessment of the potential impacts of the project. Consequently, it has relied largely on this assessment of the potential impacts of the project to complete this report.

Despite some criticism of the accuracy of previous assessments in various submissions, both the Department and the EPA are satisfied that this assessment has been carried out in accordance with the relevant guidelines, and provides a robust assessment of the potential impacts of the project.

Mitigation Measures
Since the approval of the Stage 1 project, MCM has implemented a broad array of noise mitigation measures. These measures include:
- purchasing a large buffer area around the mine to the extent where there are very few privately-owned residences properties left in the vicinity of the mine, with the closest properties being located 3-4 kilometres to the west of the approved OC 2 and OC 3 operations;
- progressively installing noise attenuation packages on its mining fleet, including 3 excavators and 17 dump trucks;
- installing a DuraTray Body on at least 4 dump trays to reduce the noise impacts of dumping on the trays;
- installing bunds around the open cut mining pits haul roads; and
- developing a comprehensive real time noise management system for the complex to assist in ensuring compliance with the relevant noise levels in the Stage 1 project approval, and minimising the noise impacts of these operations during adverse weather conditions.

The Department is satisfied that these measures represent current best management practice, and that with the implementation of these measures MCM is complying with its current noise limits.

MCM proposes to extend the use of these measures to the Stage 2 project. However, it has also:
- agreed to enter into a noise agreement with the owner of Property 63 for the acceptance of slightly higher noise impacts; and
- committed to ensure all new plant purchased for the project is properly attenuated.

Residual Impacts
The noise assessment predicts that the noise generated by the Moolarben mining complex as a whole would comply with 35dBA, the lowest possible limit under the *NSW Industrial Noise Policy*, at almost all privately-owned residences surrounding the mine, *even during adverse weather conditions*.

The only exceptions to this would be at:
- Property 63, the closest privately-owned property to the mine, where there would be marginal exceedances (1-2 dBA) of the existing noise limits only during adverse weather conditions for between 6 to 7 years of the Stage 2 project (see **Table 4**). The owner of this property already has additional noise mitigation rights under the Stage 1 approval, and as indicated above, has agreed

to enter into a negotiated noise agreement with MCM to accept higher noise impacts if the Stage 2 project is approved;

- Properties 70 and 75 to the immediate west of the mine, where there would be marginal exceedances (1-2 dBA) of the current 35 dBA limit, again only during adverse weather conditions. While these exceedances would be spread over several years (6-21, with a gradual reduction after year 11) for Property 70, they would be restricted to year 11 for Property 75 (see **Table 4**);
- Property 30, about 3 kilometres to the west of OC 3, where there would be marginal to moderate exceedances of the current 35 dBA limit, also only during adverse weather conditions. These exceedances would occur in the later years of the project when OC 3 is being mined (years 21-24 of the project), and gradually reduce as mining moves further south in OC3 (see **Table 4**). In other words, they would be due largely to the approved Stage 1 mining operations rather than the proposed Stage 2 mining operations.

The location of these properties, along with the worst-case noise contours, is shown in **Figure 10**.

Table 4: Summary of Operational Noise Limit Exceedances - Residences

Receiver ID	Criteria Day / evening / night	Predicted Worst Case Noise Level dB(A)LAeq, 15 min					
		Yr 2	Yr 6	Yr 11	Yr 16	Yr 21	Yr 24
30	35 / 35 / 35					39 (+4)	37 (+2)
31	35 / 35 / 35					36 (+1)	
63	38 / 38 / 37		38 (+1)	39 (+2)			
70	35 / 35 / 35		37 (+2)	37 (+2)	36 (+1)	36 (+1)	
75	35 / 35 / 35			36 (+1)			

The Department has considered whether any further measures could be implemented on site to ensure compliance with the relevant noise criteria at these properties, and concluded that very little could be done other than curtailing night-time operations during adverse weather conditions.

The Department has considered whether MCM should be required to curtail its night-time operations to ensure compliance, and concluded that such a requirement is not justified in this instance.

First, because these impacts would occur largely as a result of the approved Stage 1 mining operations, rather than the Stage 2 mining operations, which would be located much further away from these properties than the Stage 1 mining operations and shielded to some extent from these properties by a ridgeline.

Second, because the restriction would result in a significant economic cost to MCM and result in limited noise benefit.

Finally, the predicted noise levels at these properties during these exceedances would be quite low in an absolute sense (36 to 37 dBA in most instances), and well below the recommended night-time amenity criteria for rural areas under the INP.

Nevertheless, the Department believes MCM should be required to implement additional noise mitigation measures (such as double-glazing, insulation and/or air conditioning) at the residences on these properties if requested by the landowner.

Cumulative Noise & Sleep Disturbance

The noise assessment does not predict any exceedances of the relevant cumulative noise and sleep disturbance criteria at any privately-owned residence surrounding the mine.

Road Traffic Noise

All three mines in the region rely heavily on Ulan Road.

During the preparation of the Ulan Road Strategy, these mines commissioned Wilkinson Murray to carry out a detailed study of the potential road noise impacts of all three mines (including the Stage 2 project) on the privately-owned residences along the road, and investigate any measures that could be implemented to reduce these impacts.

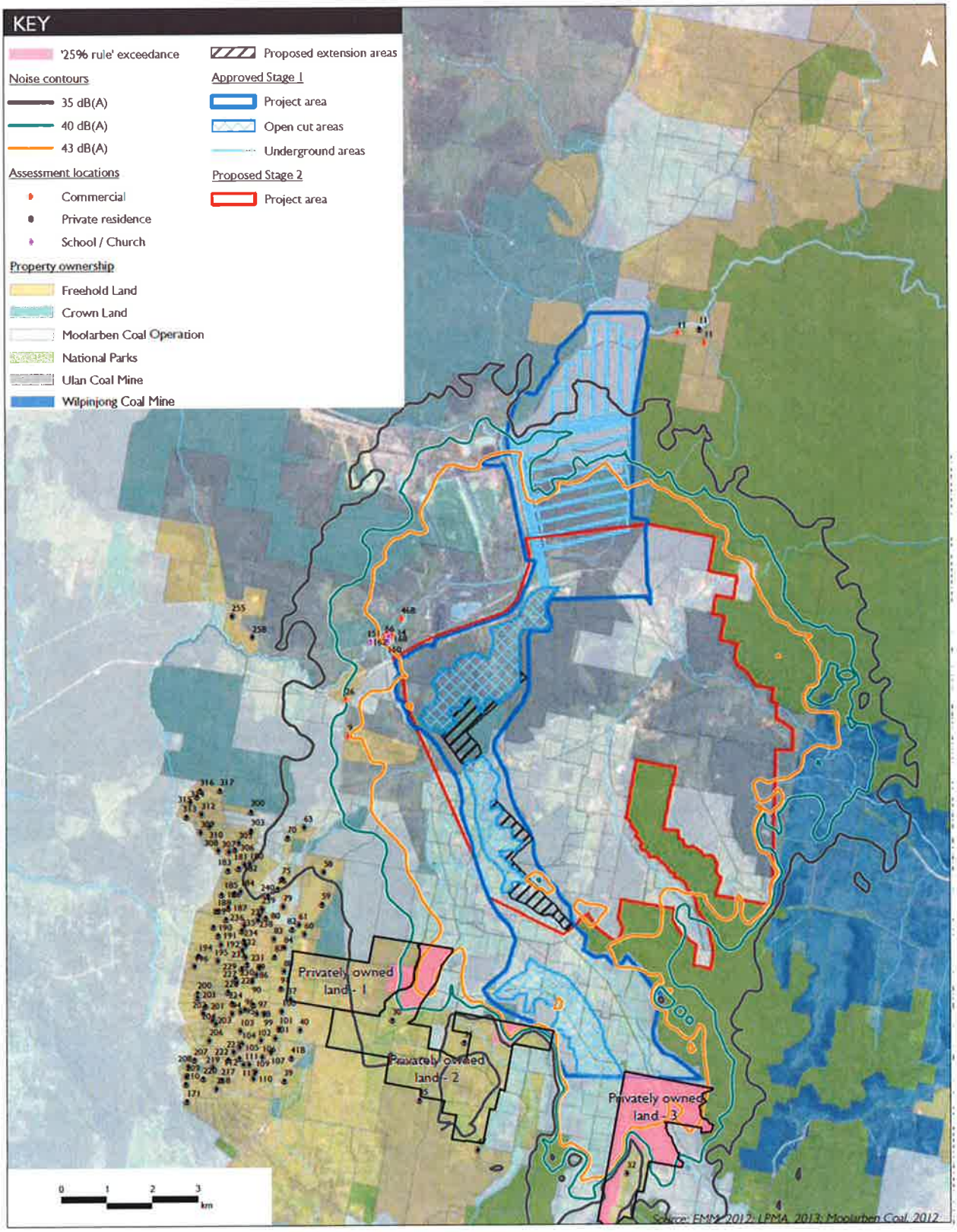


Figure 10: *Predicted Worst Case Noise Levels*

This study concluded that 18 of the residences were either experiencing or would experience exceedances of the relevant road traffic criteria at some stage over the life of the strategy, and recommended that the owners of all of these residences be given the right to ask for additional noise mitigation to be installed at these residences if requested by the owner.

The Director-General has endorsed the implementation of the recommendations of this study, and the companies are in the process of implementing the recommended noise mitigation measures in consultation with the relevant landowners.

The Department is satisfied that the mine is unlikely to contribute to adverse road noise impacts on any other roads in the vicinity of the mine, principally because there are no privately-owned residences left on the relevant section of Ulan-Wollar Road, and the project would only make a minor contribution to traffic levels on Cope Road (around 6%).

Rail Traffic Noise

The project would generate two extra train movements (one laden, one empty) between the Stage 1 rail loop and Newcastle, and sustain this impact for a further 8 years, as the life of the Stage 1 project would be extended by 8 years (from 2028 to 2037).

The Department expects this increase to generate negligible additional rail noise impacts along the railway line.

As demand for coal transport rises along the railway line, and this line is progressively upgraded by Australian Rail Track Corporation (ARTC) to cater for this additional demand, MCM's rail movements are likely to contribute (along with all the other rail movements on the line) to exceedances of the relevant criteria at certain residences along the railway. The Department believes ARTC should be held liable under its existing environment protection licence (EPL) for operations on the line for any noise abatement works along the line. Under this regime, ARTC would carry out the noise abatement works, and pass on the costs of these works onto the various users of the railway. This would provide a more equitable to deal with any noise impacts along the railway line than the current practice of holding individual mining companies liable for any abatement works on an ad hoc basis, as it would ensure that the cost for any such works is shared on a proportionate basis with all the various users of the railway line.

Nevertheless, consistent with current practice the Department has recommended that MCM be required to only use locomotives and rolling stock on site that are approved to operate on the NSW rail network in accordance with the noise limits in ARTC's EPL.

Conclusion

The Department is satisfied that the noise impacts of the project can be suitably minimised with the implementation of best management practice.

To ensure this occurs, the Department has recommended conditions requiring MCM to:

- comply with strict noise limits for the Moolarben mine complex as a whole;
- carry out regular attended monitoring (at least 12 times a year) to check whether the project is complying with these limits, and to make these monitoring results public on its website;
- commission an independent expert to review the noise impacts of the project if any landowner considers the project to be exceeding the relevant noise limits for the project on his/her land;
- comply with a range of operating conditions, including a condition requiring MCM to implement best management practice to minimise the operation, road and rail noise impacts of the project;
- implement additional noise mitigation measures (such as double glazing, insulation and/or air conditioning) at 4 residences;
- prepare a detailed Noise Management Plan for the project; and
- review and update this plan on a regular basis following each annual review and independent audit.

5.2 Air Quality

Assessments
MCM has commissioned numerous assessments of the potential air quality impacts of the project (see Appendix 3A of the EA, Appendix C of the PPR and Appendix D of the EA for the MOD 9 application). The assessments were undertaken in accordance with the applicable guidelines, including the EPA's *Approved Methods for Modelling and Assessment of Air Pollutants in NSW.*

The assessments modelled the potential impacts of the Moolarben Coal Project as a whole, and included consideration of the cumulative emissions generated by the Ulan and Wilpinjong mining operations.

The Department acknowledges that there are differences in the specifics associated with the models in the PPR and the EA for MOD9, including differences in the alignment of modelled operational years, changes in OC1 and OC2 pit areas in the MOD9 assessment, and some differences in operational assumptions.

However, the Department and the EPA are satisfied that both models are suitably conservative and provide outcomes that are broadly the same.

Mitigation Measures
MCM has implemented a range of air quality mitigation measures in association with the Stage 1 mining operations. These measures include:

- buying a large buffer area around the mine;
- minimising dust emissions from haul roads, and striving to achieve 80% control efficiency;
- minimising dust emissions associated with materials handling on site (by using larger haul trucks, installing automatic sprays on the ROM hopper and ROM pad, etc);
- minimising surface disturbance, and stabilising or rehabilitating disturbed areas as quickly as possible; and
- operating a comprehensive air quality management system, particularly to minimise air quality impacts during adverse weather conditions.

The Department is satisfied these measures represent current best management practice, and that MCM is generally complying with the existing requirements in the Stage 1 project approval in relation to air quality. To some extent, the EPA is now driving the implementation of these measures at mines throughout NSW under its "Dust Stop Program". This has resulted in the imposition of several Pollution Reduction Programs on MCM's environment protection licence.

MCM proposes to extend the implementation of these measures to the Stage 2 project.

The EPA has indicated it will review the effectiveness of these measures under its "Dust Stop Program", and require improvements if necessary to ensure MCM continues to implement best management practice. Already in this regard, the EPA has indicated that the existing real time management system should be expanded to included the Ridge Road/Winchester Crescent areas to the west of the mine.

Predicted Impacts
The air quality assessment predicts that dust emissions generated by Stages 1 and 2 of the project will comply with all relevant dust criteria at privately owned residences for each year modelled. Similarly, the cumulative impact assessment predicts that the cumulative dust levels will remain in compliance with all relevant criteria.

A summary of the predicted worst-case dust impacts of the project is shown in **Table 6**.

Table 6: *Predicted Worst-Case Air Quality Emissions at Privately Owned Residences*

EPA Criterion		Maximum Predicted Air Quality Emission at a Privately Owned Residence	
		Moolarben Stage 1 & 2	Cumulative
Annual average dust deposition (g/m^2/month)	4	0.8	2.9
Maximum 24-hr average PM_{10} ($\mu g/m^3$)	50	45	-
Maximum annual average PM_{10} ($\mu g/m^3$)	30	9	23
Maximum annual average TSP ($\mu g/m^3$)	90	10	45

A further assessment was undertaken of the potential for *cumulative* 24-hr PM_{10} to exceed the 50 $\mu g/m^3$ criterion. The assessment indicated that there is the probability that PM_{10} concentrations would exceed the criterion on rare occasions in the vicinity of the Ulan Village to the west of the mine, under worst case meteorological conditions. The air quality assessment undertaken as part of the MOD9 assessment indicated a similar outcome, and concluded that any exceedances would be infrequent and therefore not significant.

The Department and the EPA accept that the 24-hr PM_{10} emissions can be adequately managed through the continued operation of the real-time air management system, and the Department has recommended conditions to ensure the system continues to be used to guide the day to day planning of mining operations, and assist in preventing air quality impacts during adverse weather conditions.

Although there are currently no air quality criteria for $PM_{2.5}$, the air quality assessment includes predicted $PM_{2.5}$ contours (refer to Appendix F of Appendix C of the PPR), which indicates that the $PM_{2.5}$ impact area would be less than the area predicted to be affected by PM_{10} impacts and therefore acceptable.

The Department is satisfied that risks of adverse impacts associated with other gaseous emissions such as blast fumes is low, principally because of the significant buffer areas between the mining operations of the nearest privately owned residences.

Conclusion

The Department is satisfied that the predicted air quality impacts associated with the project are generally acceptable, and that the risks of adverse impacts are low and can be adequately managed through the implementation of best practice mitigation and management measures.

To ensure this occurs, the Department has recommended conditions requiring MCM to:

- comply with contemporary air quality criteria;
- implement all reasonable and feasible 'source-based' measures to minimise dust emissions on site;
- acquire any property if dust emissions exceed the applicable land acquisition criteria, if requested by the landowner;
- undertake additional dust mitigation measures (such as air filters or air conditioning) at privately-owned or mine-owned residences predicted to be significantly or moderately affected, or at any other residence if dust emissions exceed the applicable criteria, if requested by the landowner (or the tenant of any mine-owned residence);
- develop a comprehensive Air Quality & Greenhouse Gas Management Plan for the complex, including a real-time dust monitoring program and an active management system which includes an early warning alert system to identify and manage potential exceedances;
- independently investigate air quality complaints and undertake applicable management measures;
- notify affected landowners (including the tenants of mine-owned properties) of the potential health-related impacts associated with mine dust;
- co-ordinate the air quality management on-site with air quality management at nearby mines, to minimise cumulative air quality impacts.

5.3 Subsidence

Issue

The project would cause surface and sub-surface subsidence impacts, which could have adverse consequences for a range of built and natural features.

Consideration

Underground Layout

The project would involve the extraction of coal from two underground mining domains, known as UG1 and UG2, using longwall mining methods. Coal would be extracted from the top section of the Ulan Coal Seam, with extraction seam thickness varying from 2.1 to 3.2 metres.

Underground mining would involve 13 longwalls in total: 9 of these longwalls would be extracted from the UG1 mining domain (LW 1-9) while the remaining 4 longwalls would be extracted from UG2 mining domain (LW 10-13) (see **Figure 12**). Longwall panels would be between 270m and 305m wide and 1675m and 2870m long. The depth of cover of the longwalls varies from 35m to 165m, which is considered to be relatively "shallow" mining.

Subsidence Assessment

Mine Subsidence Engineering Consultants (MSEC) prepared a detailed subsidence impact assessment (SIA) of project (see Appendix 8 of the EA).

This assessment is underpinned by empirical data from previous mining operations throughout NSW, including the neighbouring Ulan coal mine.

The Department commissioned Emeritus Professor Jim Galvin to review the SIA, and provide expert advice on the reasonableness and accuracy of MSEC's subsidence predictions and impacts. Dr Galvin's review is attached in **Appendix G**. Dr Galvin concluded that subsidence predictions were conservative, and are likely overestimate the actual impacts of the project on sensitive features.

MSEC subsequently updated the SIA to assess the implications of the various changes to the project following the exhibition period (see Appendix I of the PPR).

The Department is satisfied that the updated SIA provides a robust assessment of the potential impacts of the project.

Notwithstanding this conclusion, the Department notes that there is still scope for localised anomalies due to geological structures and other effects that are not necessarily fully predictable in natural systems. Consequently, the Department has recommended conditions requiring MCM to validate the SIA's predictions during mining operations. This is consistent with Dr Galvin's recommendation.

Subsidence Predictions

MSEC predicts the land surface overlying the proposed underground mining domains would subside by a maximum of 1.98m, which is predicted to occur over LW3. It also predicts maximum tilts of 95 millimetes/metre (mm/m) and maximum horizontal (tensile and compression) ground strains of 50 mm/m.

The height of the fractured strata zone is predicted to extend up to the existing ground surface level, however it is considered unlikely that cracking will be continuous from the seam up to the surface. Surface cracking is predicted to be more visible where depth of cover is less than 100 m. However, MSEC notes that there are some basalt intrusions above the proposed longwalls, which may be of sufficient strength to prevent fracturing from reaching the surface in some locations.

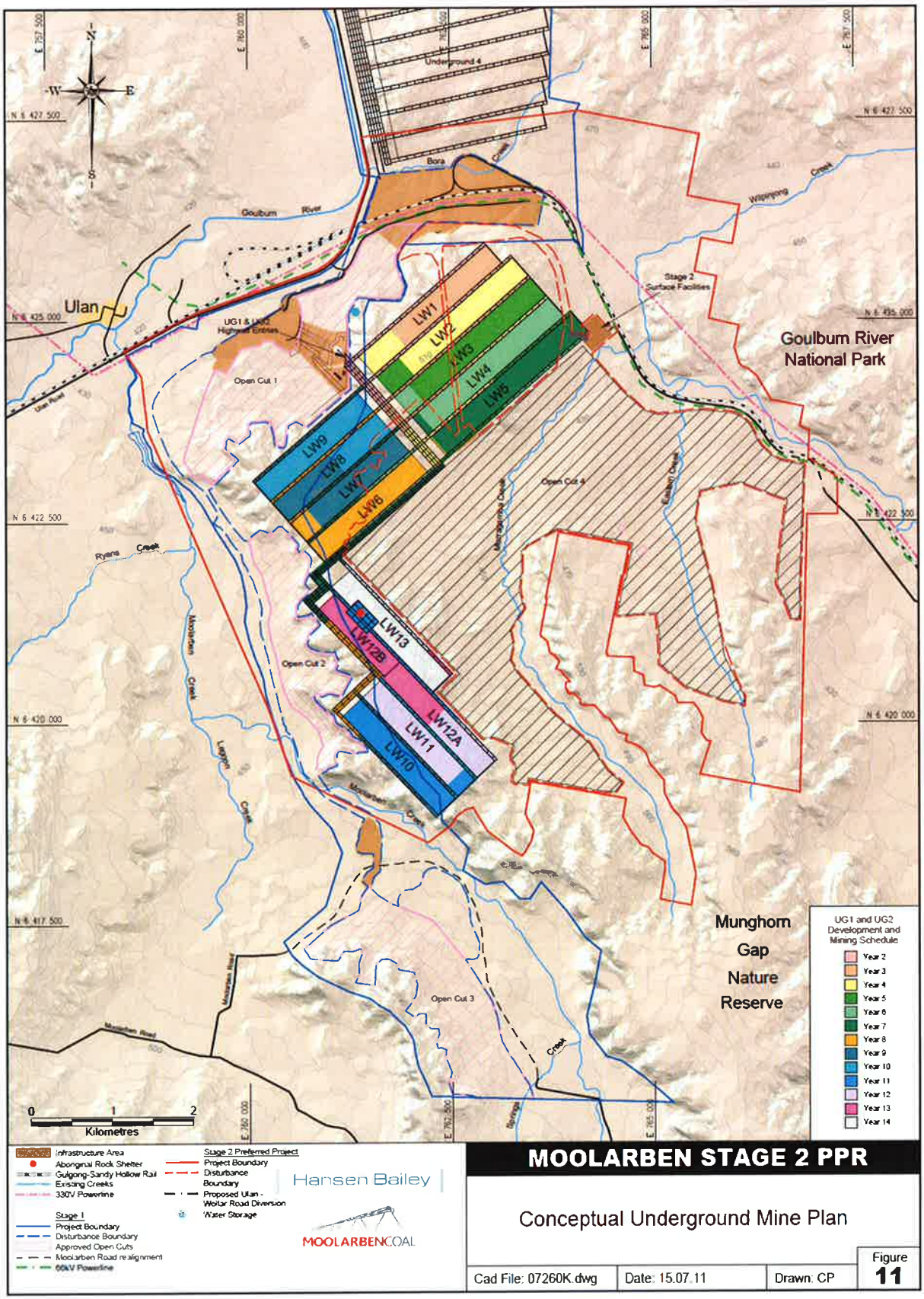


Figure 12: *Conceptual Underground Mine Plan*

Natural and Built Features

MSEC assessed the likely subsidence impacts of the project on a range of natural and built features (refer to **Figures 13** and **14** respectively), including:

- local landforms (including cliffs and steep slopes);
- Munghorn Gap Nature Reserve;
- local infrastructure (including fences, farm dams and access roads);
- public infrastructure and utilities (including Gulgong-Sandy Hollow Railway line, power and communication lines, optical fibre cables and a survey control mark);
- proposed mining infrastructure (including the northern out-of-pit emplacement area, Stage 2 ROM coal facility, conveyor and OC4 highwall);
- groundwater and surface water – see Sections 5.4 and 5.5 respectively;
- fauna – see Section 5.6;
- Aboriginal heritage sites – see Section 5.8; and
- Historic heritage sites – see Section 5.10.

In order to protect some of these features from the effects of mine subsidence, MCM has committed to leaving barriers/blocks of in-situ coal in a number of locations, namely:

- north east of the limit of UG1 to protect the Gulgong-Sandy Hollow rail line;
- south and east of the limit of UG2 to protect Munghorn Gap Nature Reserve; and
- above the northern portion of UG2 to protect an Aboriginal rock art shelter and archaeological objects along Cliff 7 (C7).

This would result in the sterilisation of up to 7.73 Mt of ROM coal, which is worth anywhere between $580 and $970 million dollars (depending on the fluctuating value of the resource).

Dr Galvin questioned the design of the barriers to protect these features, which is based on an angle of draw of 26.5°. Dr Galvin notes that in many situations, it is not unusual to apply a higher angle of draw to protect features (i.e. up to 35°). To address this issue, the Department has recommended subsidence impact performance measures to ensure the impacts on these features are acceptable.

In relation to cliffs, MSEC indicates that there are 10 cliffs (defined as being >20m in length and >10m in height), which total 520 metres in length, located above or near the underground mining domains (refer to **Figure 13**). The majority of these cliff lines are relatively small (20m long and <15m in high). However there are two cliffs, which are considered more significant (C9 which is 100m long and 20m high and C10 which is 200m long 40 m high).

MSEC indicates that two of the cliff lines (ie. C2 and C3), with a total length of 40m, would be covered by the northern out of pit emplacement area; and three cliff lines (ie. C4, C7 and C10), with a total length of 320m, would be outside the subsidence impact zone. Based on previous experience of mining below sandstone cliffs, MSEC conservatively predicts that up to 15% of the length of the remaining cliffs would experience rock fall due to subsidence, particularly along Cliffs C8 and C9 which are more continuous, longer cliff lines. This equates to approximately 72m of total length of cliff line above the underground mines. MSEC has indicated that these cliff lines are not visible from public roads or public vantage points as they are positioned behind environmental bund walls, open cut pits and out of pit emplacement spoil heaps.

Rock fall has the potential to affect the potential habitat of cave-dependent bat species and Aboriginal heritage sites (see Sections 5.6 and 5.8 below). It could also jeopardize public safety. However, as the vast majority of the land above the proposed mining area is mine owned, the public safety risks associated with any rock fall are considered to be extremely low and manageable.

The Department has considered this issue in some detail, and weighed up the relative merits of resource extraction with the conserving landforms of local or regional significance. Based on this consideration, the Department has concluded that the MCM should be required to ensure the impacts on C9 are no greater than negligible. This is because it is a significant landform in the area; and the fact that it should be relatively easy for MCM to reduce the impacts on this cliff given its location on the edge of LW12.

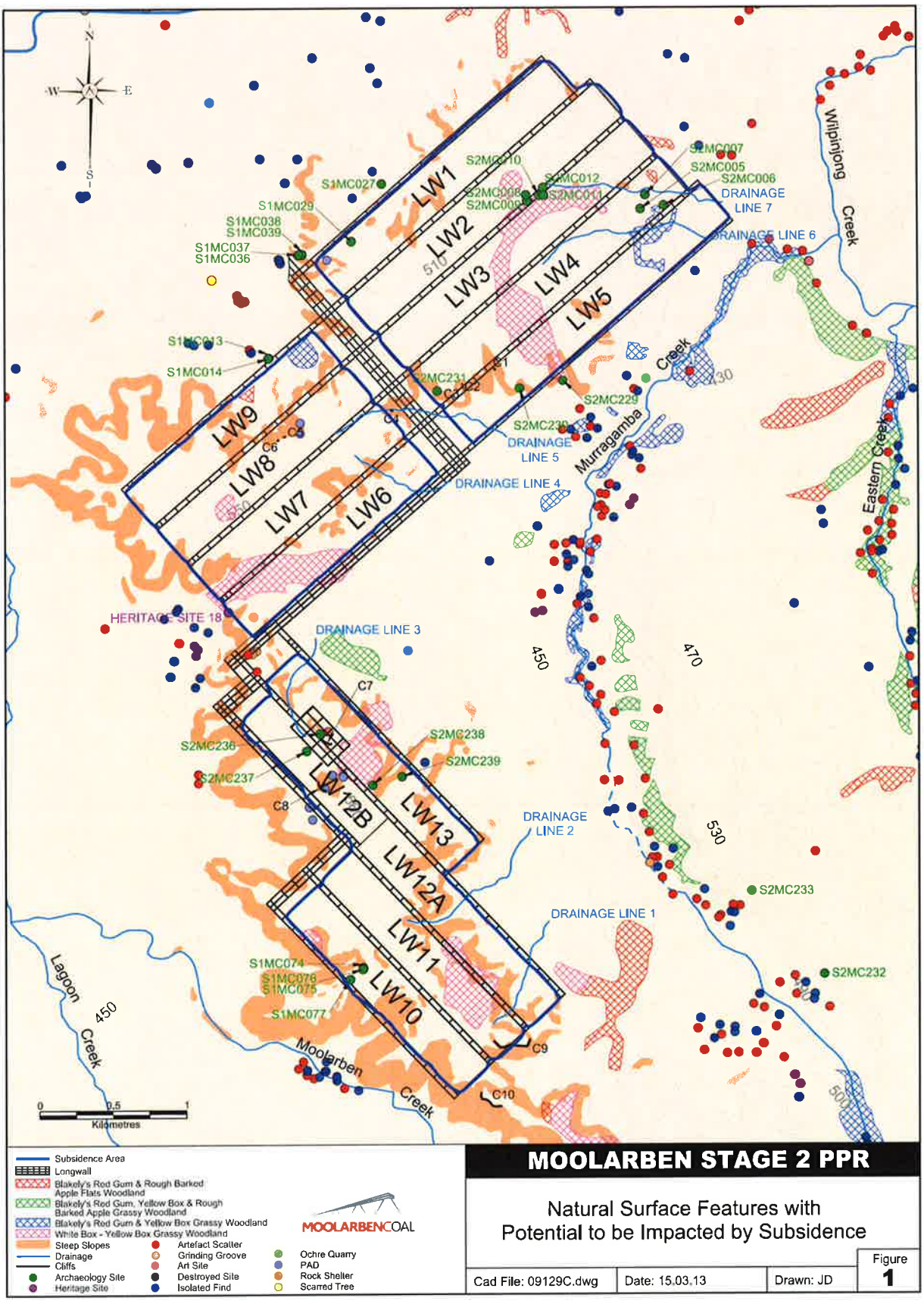


Figure 13: *Natural Surface Features with Potential to be Impacted by Subsidence*

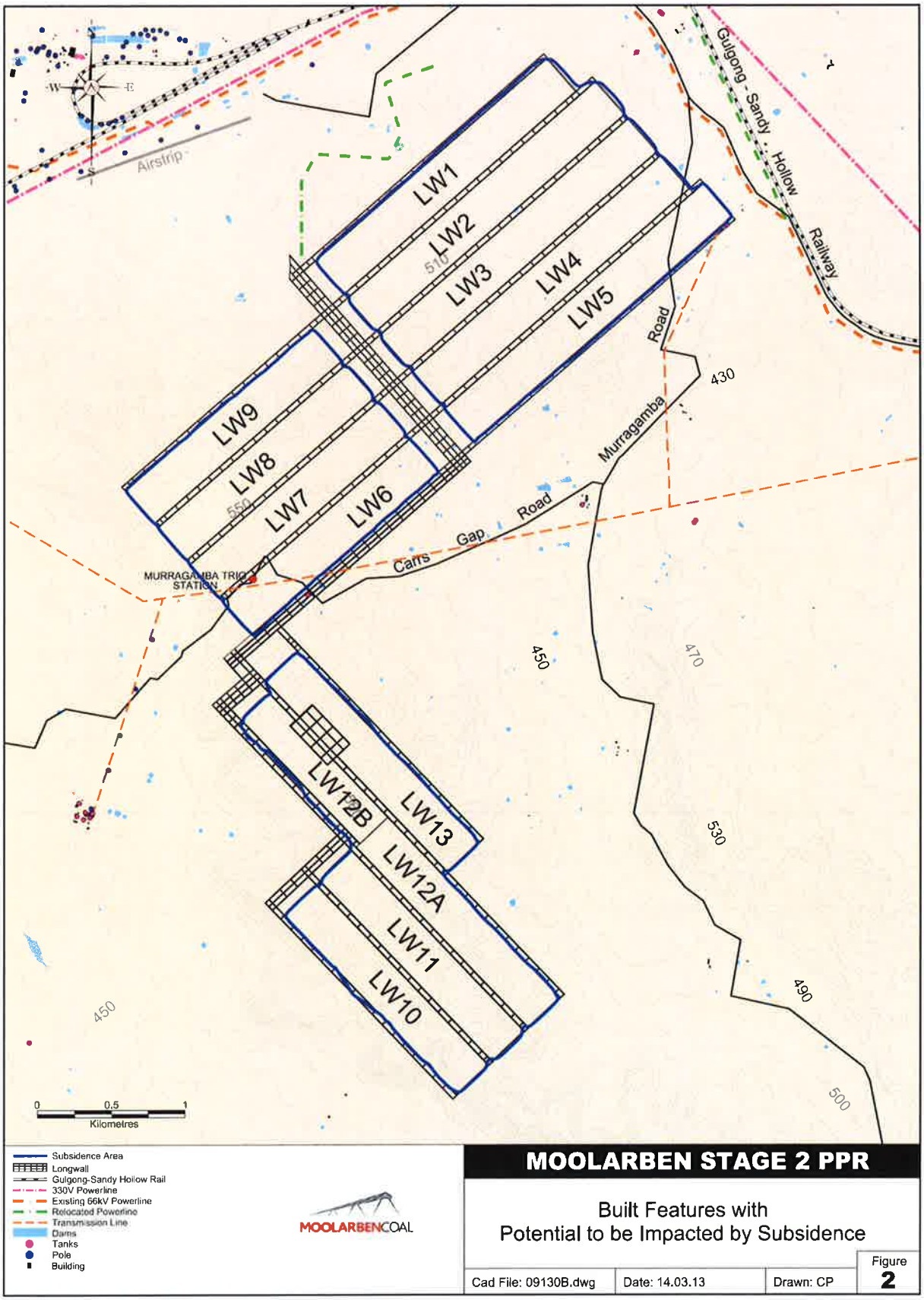


Figure 14: *Built Features with Potential to be Impacted by Subsidence*

With this requirement in place, the Department is satisfied that the most significant cliffs in the area (C7, C9 and C10) would be protected from any significant environmental impacts, and that the predicted impacts on the other cliffs in the area would be acceptable.

In relation to other sensitive features located above or in close proximity to the Stage 2 underground mining operations, the Department is satisfied that:

- public safety risks associated with surface cracking and/or rock fall are considered to be extremely low and manageable as the vast majority of the land above the proposed mining area is unused mine owned land;
- the local roads (including Murragamba Road and Carrs Gap Road) are no longer required for access to privately-owned land and can therefore be closed to the public;
- the farm dams located within subsidence affectation areas are all on mine-owned land, and are therefore no longer required for farming;
- the fences on privately owned land which are damaged by subsidence can be readily repaired or replaced;
- the Gulgong-Sandy Hollow Railway line and fibre optic cable are located outside of the subsidence affectation areas, and are unlikely to be impacted by any measureable systematic mine subsidence;
- the low voltage powerline can be terminated on the western side of Carrs Gap and the telecommunication cable can be removed in consultation with relevant service providers prior to the commencement of underground mining;
- the Murragamba Trig Station can be re-established once the ground has stabilized in the vicinity of LW6; and
- the mine infrastructure proposed to be constructed within the subsidence affectation areas (including the northern out-of-pit emplacement area, Stage 2 ROM coal facility, conveyor and OC4 highwall) can be monitored, managed and if necessary repaired to ensure its safety and serviceability is maintained.

Consequently, it is satisfied that the subsidence impacts of the project on these features can be suitably managed to ensure acceptable outcomes via the standard Extraction Plan process, and has drafted conditions to ensure this occurs.

Conclusion

Both the Department and DRE are satisfied that MCM has adequately assessed the potential subsidence-related impacts of the project, using conservative assumptions, and that the impacts of the project can generally be mitigated and/or managed to ensure an acceptable level of environmental performance.

To ensure this occurs, the Department has recommended conditions requiring MCM to:

- comply with strict performance measures for a range of natural, heritage and built features;
- ensure the impacts on C9 are restricted to negligible;
- prepare a detailed Extraction Plan for all second workings on site, and secure the Director-General's approval for the plan prior to carrying out any of these second workings;
- monitor the subsidence impacts of each longwall panel (including any environmental consequences), and implement adaptive management if any unforseen impacts occur; and
- in the unlikely event that such unforseen impacts do occur, and the impacts cannot be satisfactorily remediated, provide suitable offsets to compensate for any loss associated with the impacts.

The Department has also updated the subsidence conditions in the Stage 1 approval to reflect the changes to the regime for managing subsidence in NSW that have come into effect since the original approval was granted.

5.4 Groundwater

Issue

Many of the submissions objecting to the project raised concerns about the project's potential impacts on local and regional groundwater resources, including:

- the validity of the groundwater modelling;
- impacts of groundwater drawdown on significant local features such as "the Drip";
- impacts on groundwater quality;
- provision of alternative water supply to compensate for any loss of groundwater and baseflows; and
- cumulative impacts on region's groundwater resources.

Consideration

The Groundwater System

The hydrological system in the vicinity of the site has been extensively monitored and is well defined. The regional rock strata are shown conceptually in **Figure 15**. They comprise an extensive sequence of Permain coal measures, which dip to the north-east across the project area and contain the Ulan Coal Seam which MCM proposes to mine. This sequence is overlain by Triassic and more recent sedimentary rocks, which have been eroded and incised by current-day surface drainage and commonly form the upland plateaus of the project area.

The Ulan Seam contains the principal aquifer, which is exploited via boreholes throughout the region, as well as via numerous seeps and springs which feed several local dams. Groundwater levels within these coal measures have already been extensively impacted by the pumping of groundwater for dewatering at Ulan Coal Mine and to a lesser extent as part of the Moolarben Stage 1 operations.

The Triassic age aquifers within the Stage 2 area are generally unsaturated. More recent Tertiary-age palaeochannel deposits and Quaternary alluvium are poorly developed across the Stage 2 area and contain only localised aquifers with minor groundwater resource potential.

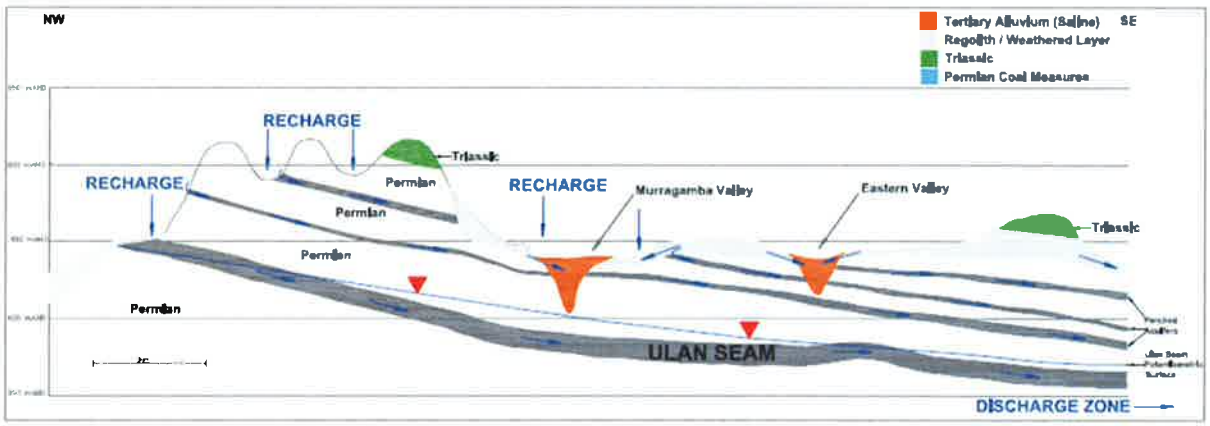


Figure 15: *Conceptual Hydrological Cross-section*

Groundwater Assessment

MCM engaged Aquaterra Pty Ltd (Aquaterra) to undertake a detailed groundwater assessment for the project as part of the original EA (refer to Appendix 5 of the EA). This assessment considered the cumulative impact of Moolarben, Ulan and Wilpinjong coal mines operating concurrently.

The Department commissioned Dr Frans Kalf of Kalf & Associates Pty Ltd to undertake a peer review of the assessment, and provide advice on the accuracy of Aquaterra's groundwater predictions and the magnitude and extent of impacts. Dr Kalf's initial review comments are attached in **Appendix G.**

Aquaterra subsequently undertook a revised groundwater impact assessment as part of the PPR (refer to Volume 2 of the PPR) to account for changes in groundwater predictions as a result of the preferred project and address comments raised by Dr Kalf and other submitters. The revised

assessment also incorporated additional monitoring data and included a re-calibration of the groundwater model against observed impacts on groundwater levels at Ulan Coal Mine.

At the request of the Department and in response to issues raised by NOW on the PPR, this assessment was subsequently augmented by further groundwater impact assessment, which provides details of the potential incremental groundwater impacts of the Stage 2 project only (refer to Appendix F of the RTS).

In addition, MCM engaged Aquaterra to prepare a groundwater accounting and water sharing plan summary which provides further details of the predicted groundwater use for the Stage 2 project, associated water licensing requirements and the relevance of the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009* (WSP) rules to the project. A copy of this summary is provided in **Appendix H.**

The Department recommissioned Dr Kalf to undertake a peer review of the adequacy of all the groundwater-related documentation provided following his original peer review of the EA. A copy of Dr Kalf's final review comments are attached in **Appendix G**.

Adequacy of Groundwater Modelling
Dr Col Mackie (on behalf of Ulan Coal) and a local landowner queried the differences in the groundwater analysis undertaken for the Ulan and Moolarben projects. Key differences in the models included the manner in which inflow was interpreted and extracted from the model output, and the Triassic strata surface cracking predictions and subsequent losses in stream flows.

Dr Kalf undertook a detailed comparison of both the Ulan and Moolarben models, and concluded that "*the inflow estimates are in reasonable agreement allowing for hydrogeological differences that occur between the two mine sites and the high sensitivity of such inflow estimates to strata permeability*". In addition, Dr Kalf indicated that he agreed with Aquaterra that implications of surface cracking of the Triassic strata *"are not significant because this strata is not saturated within the Stage 2 mining zone".*

Overall, Dr Kalf concluded that the hydrological and computer model analysis for the project were satisfactory, but should updated and verified over time as mining occurs and additional data becomes available.

The Department agrees with this conclusion, and has recommended conditions to ensure the monitoring and validation process is implemented.

Non-Alluvial Aquifers
The Stage 2 project would take groundwater from the Permain hard rock aquifer system through indirect groundwater inflows into the mine (see **Table 7**). The maximum rate of mine inflows from the non-alluvial aquifers into the Stage 2 mining operations (OC4, UG1 and UG2) is predicted to be 834 ML/annum. This would occur during year 10 when OC4 and UG1 are at their largest.

Table 7: *Predicted Mine Inflows from Non-Alluvial Aquifers*

Mine Year	Volume (ML/a)
0	0
2	87
4	311
6	324
8	554
10	834
12	732
14	641
16	292
18	327
20	422

In its submission, NOW indicated that MCM would require a licence under the *Water Act 1912* for this water take. The Department notes that there are currently no restrictions on the availability of new groundwater entitlements for non-alluvial rock aquifers in the Hunter Valley, and consequently is satisfied that MCM should have no difficulty securing the necessary licence for this water take during the project.

Groundwater Drawdown

These inflow rates would result in predicted drawdowns of up to 5 metres in the Ulan Seam and the lower Permian coal measures at the mine's eastern boundary, with drawdowns of up to 60 metres within the OC4 pit. Maximum drawdowns of up to 10 metres are predicted in the middle and upper Permian coal measures. As shown in **Figure 16**, the drawdowns in the Permian coal measures occur predominantly within the Moolarben mine lease boundary.

No drawdowns are predicted to occur in the Triassic as this unit is unsaturated across the Stage 2 underground and open cut mining areas.

Modelling results indicate that following the completion of mining, it will take approximately 100 years for the groundwater table to recover to pre-mining levels.

Cumulative impacts on groundwater from the Moolarben Stage 2 operations as well as past and present mining operations at Ulan, Wilponjong and Moolarben Stage 1 were assessed in the original groundwater assessment. This assessment predicts that cumulative drawdowns of 5 metres or more would extend to approximately 13 km in the lower Permian, and 8-9 km in the middle and upper Permian to the north and east of the Stage 1 UG4 at the completion of mining.

Groundwater Bores

The depth and saline nature of the groundwater source in the Ulan Seam and Permian strata has generally rendered it unsuitable for domestic use.

Consequently, the loss of pressure induced by mining within the hard rock strata (Triassic or younger) is predicted to affect a relatively small number of privately-owned bores, including:

- 5 registered bores predicted to experience maximum drawdowns of 0.6m, which are predicted to have a residual drawdown of 0.4m at the completion of mining; and
- 4 registered bores predicted to experience maximum drawdowns of 0.2m, which are predicted to fully recover post-mining.

The description and location of each of these bores is provided in Appendix E of the PPR.

While the predicted drawdowns are not considered large enough to affect the performance of any of these bore, MCM has committed to provide compensatory water supplies to any landowner whose water entitlements are adversely affected by the project. The Department supports MCM's commitment, and has recommended conditions to ensure this occurs.

"The Drip"

The community expressed concerns about the potential cumulative groundwater impacts of mining on the water supply of the "the Drip". This issue was also raised by the community during the Ulan Continued Operations assessment process.

Both Aquaterra Pty Ltd and Mackie Environmental Research Pty Ltd (Ulan's hydrogeological consultant) are of the opinion that "the Drip" is a perched aquifer system that would be "isolated" hydraulically from any drawdown effects due to mining in the long term.

Similarly, in his latest review comments Dr Frans Kalf indicates that:

> *"all parties agree that the 'Drip' and seepage emanating from the sandstone escarpment on the northern side of the river is a perched groundwater system. It is recharged by rainfall replenishing groundwater storage within the elevated terrain sandstones above the 'Drip'".*

The Department notes that in order to confirm this view UCML is required under its project approval to carry out further investigations into the water supply of "the Drip", in conjunction with the MCM. In addition, the existing Stage 1 project approval requires MCM to ensure that the project has negligible impact on groundwater supply to 'the Drip'.

While the Department believes it is highly unlikely the Stage 2 project would have an adverse impact on the water supply to the 'Drip', it has duplicated the existing Stage 1 condition in the recommended Stage 2 approval.

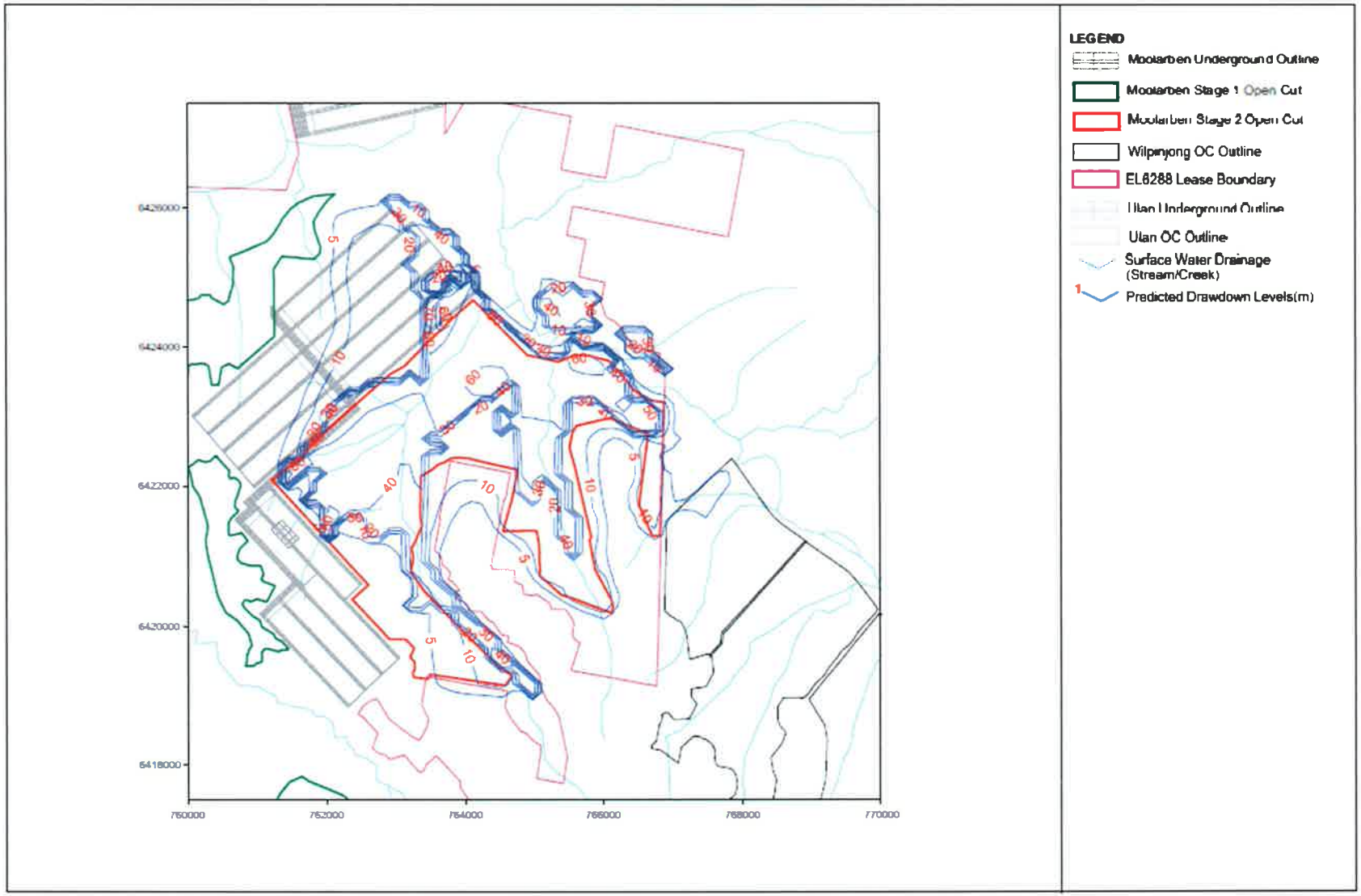


Figure 16: *Predicted Groundwater Drawdown in the Lower Permian Coal Measures*

Conclusion

The Department is satisfied that the revised groundwater assessment provides a sound basis for assessing the potential groundwater impacts of the project. It is also satisfied that the groundwater impacts of the project are unlikely to be significant, and that MCM should have no trouble securing the necessary water licences to account for any groundwater take.

Nevertheless, the Department has recommended conditions requiring MCM to:

- obtain an applicable water licence for any groundwater take under the *Water Act, 1912*;
- provide compensatory water supply to any privately landowner whose water supply is adversely affected by the project;
- ensure the Stage 1 project has no greater than negligible on the water supply to "the Drip";
- comply with a range of water performance measures; and
- prepare a detailed Groundwater Management Plan for the project, which includes:
  - baseline data on groundwater levels, yield and quality in the region, and privately-owned groundwater bores, that could be affected by the project;
  - groundwater assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts;
  - a program to monitor and report on the impacts of the project;
  - a program to validate the groundwater model for the project, including an independent review of the model every 2 years, and comparison of monitoring results with modelled predictions;
  - a plan to respond to any exceedances of the groundwater assessment criteria; and
  - a protocol for working with the other mines in the region to minimise cumulative groundwater impacts, carry out joint monitoring, and share data.

5.5 Surface Water

Issue

Surface Water Catchments

The majority of the submissions objecting to the project raised concerns about impacts of the project on surface water resources, including:

- the accuracy of the water balance;
- disturbing the Murragamba and Eastern Creek catchments and impacting water quality;
- loss of alluvial groundwater and baseflow to creeks and rivers;
- affecting surface water flows in local and regional catchments;
- adequacy of the proposed water management system; and
- impacts of diverting and realigning sections of Murragamba and Eastern Creeks.

Consideration

The project is located within the Wollar Creek catchment, predominantly within the sub-catchments of the Murragamba and Eastern Creeks. Murragamba and Eastern Creeks are tributaries of Wilpinjong Creek, which flows eastwards into Wollar Creek, through the Goulbourn River National Park where it joins the Goulbourn River (about 30 km downstream of the project) and eventually feeds into the Hunter River. A small section of stage 2, primarily the infrastructure area, is located within the Bora Creek sub-catchment, which flows directly into the Goulburn River. The existing catchment hydrology is shown in **Figure 15**.

Murragamba and Eastern Creek are low order ephemeral drainage systems that only flow in response to recent rainfall. The combined catchments of Murragamba and Eastern Creeks cover an area of about 3,150 ha, which is approximately 6% of the total area of the Wollar Creek catchment. Both creeks have reaches which are heavily degraded, incised and are continuing to erode (**Photo A**). Water quality in the creeks in the vicinity of the project is generally poor and indicative of slightly or moderately disturbed systems.

Photo A: *Lower reaches of Murragamba Creek*

Surface Water Assessment

MCM engaged Worley Parsons Pty Ltd (Worley Parsons) to undertake an assessment of the potential surface water impacts associated with the project (refer to Appendix G of the EA). The assessment included a water balance and modelling to assess the impacts of the project on water quality and flows, creek diversions and realignment, and flooding.

The Department commissioned Mr Lindsay Gilbert to undertake a peer review of the surface water and water balance assessments, and provide advice on the accuracy of Worley Parson's water balance predictions, the magnitude and extent of impacts and the adequacy of the proposed surface water management system. Mr Gilbert's initial review comments are attached in **Appendix G**.

Worley Parsons subsequently undertook a revised surface water impact assessment as part of the PPR (refer to Volume 3 of the PPR) to account for changes in surface water predictions as a result of the preferred project and address issues raised by Mr Gilbert, NOW, EPA and other submitters. The revised assessment included additional baseline data, revised catchment modeling, a dirty water balance and a refinement of the clean water management system. In addition, a Baseline Surface Water Run-off Assessment was undertaken to address concerns raised by NOW in relation to environmental flows (refer to Appendix E of the RTS on the PPR).

Following another peer review of the revised assessments by Mr Gilbert, the Department received additional information including updated baseline hydrological data, specific water management system requirements, results of more comprehensive water balance modelling, assessment of final voids and water licencing requirements. A copy of the additional review comments and subsequent surface water information is provided at **Appendices G** and **H**, respectively.

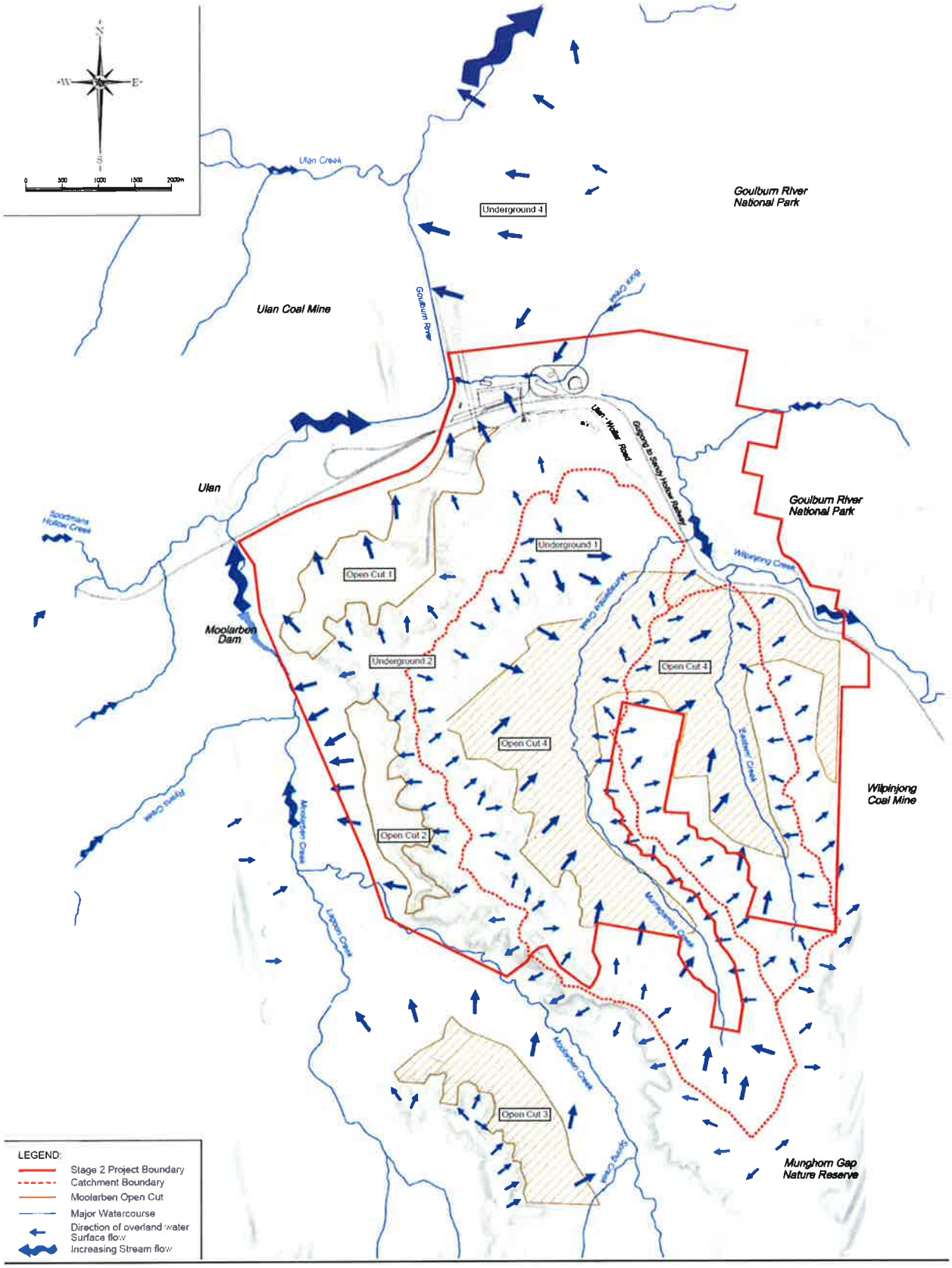


Figure 15: *Existing Catchment Surface Water Hydrology*

Water Balance

A complex-wide predictive water balance model, which was based on water usage data collected during Stage 1 operations, was extended for the Stage 2 operations.

In response to issues raised by Mr Gilbert regarding some of the assumptions made in the model, the model was refined to include a daily time-step analysis for the 130 year daily rainfall data available for the Gulgong Rainfall Gauge. Mr Gilbert concluded that the refined model provides a substantially improved basis for predicting water balance and assessing the adequacy of the water management system.

The model shows that the main water demands for the complex would be the water used in the CHPP, the underground mine and for dust suppression. The main water sources would be inflows to the underground and open cut mines, dirty water from disturbed areas contained in on-site dams, water transferred from the Ulan mine under the Ulan Water Sharing Agreement (UWSA) (ie. minimum of 1000ML/a), and water from the Northern Borefield (NB). The predicted water balance for the complex is summarised in **Table 8**.

Table 8: *Predicted Moolarben Complex Water Balance*

Mining Years	Median Annual Water Deficit (without UWSA or inflows from NB) ML/a	Water Deficit (including UWSA and inflows from the NB) ML/a		
		Median	90%ile Deficit	10%ile Deficit
1-5	1875	-174	194	-465
6-10	2464	599	950	166
11-15	2529	472	779	99
16-20	2500	381	601	150
21-24	2046	241	474	-13
Note: A negative value indicates a surplus after all available water is taken and distributed from both the UWSA and the NB.				

The water balance indicates that there would be a water deficit for the majority of the mine years.

MCM has indicated that the predicted deficits would be met by accessing additional water from Ulan via a modified agreement. MCM has indicated that the existing water transfer infrastructure between the mines has the capacity to be upgraded to provide up to 2 gigalitres/annum of water if required and that UCML has indicated that the existing volume of water transferred to Moolarben could be increased.

The Department believes this strategy is feasible given Ulan is predicted to have significant water surpluses (ie. in excess of 2990ML/a) during the life of the project and supports increased water sharing between the mines in the region.

Nevertheless, the Department has included a condition requiring MCM to maximise water sharing with the other mines in the region. It has also recommended that MCM be required to ensure it has sufficient water for all stages of the project, and if necessary adjust the scale of operations on site to match its available water supply.

Table 8 indicates that surpluses of around 174 ML/annum are predicted during the initial mining operations (ie. Years 1-5). MCM has indicated that the surpluses will be controlled by reducing pumping of water from the NB to avoid excess build-up of water in on-site storages. MCM has also indicated that the water management system has been designed to contain any water surpluses (see discussion below).

Alluvial Aquifers and Baseflows

Modelling indicates that the project would affect groundwater discharges, including alluvial groundwater take and associated baseflow reductions, to local creek systems within the Goulburn River Catchment (ie, Lagoon Creek, Moolarben Creek, Ulan Creek and the Goulburn River) and within the Wilpinjong Creek Catchment (i.e. Murragamba Creek and Wilpinjong Creek). Eastern Creek was not included in the modelling because it is generally dry between rainfall events.

In response to a request from NOW, Aquaterra predicted the groundwater discharges or "take" of the Stage 2 operations through the following processes:

- loss of recharge to the alluvium within the mining area (OC4, UG1 and 2) - 1.8ML/a;
- direct loss of groundwater stored within mined volume of alluvium within the mine area – 160ML/a; and
- indirect groundwater inflows into the mine (via the Permain hard rock aquifer system) – 6.5ML/a.

The maximum alluvial aquifer groundwater loss from these sources is predicted to be **168 ML/a**, the majority of which would be attributed to the direct loss of groundwater held in storage within the alluvium.

In addition to this "take", the associated baseflow losses in both the Goulburn River Catchment and Wilpinjong Creek Catchment were predicted over the life of the mine. These are presented in **Table 9**.

Table 9: *Predicted Baseflow losses Attributed to Stage 2 operations*

Mine Year	Predicted Baseflow Loss (ML/annum)	
	Goulburn River Catchment	Wilpinjong Creek Catchment
0	0.0	0.0
2	0.1	3.2
4	0.1	6.1
6	0.4	6.7
8	0.0	6.8
10	1.1	34.6
12	2.6	57.6
14	1.1	64.1
16	5.4	65.7
18	7.0	66.7
20	6.7	67.9
End of recovery	5.9	9.2

The maximum reduction in baseflow (ie. 67.9ML/a) is within the Wilpinjong Creek catchment (a sub catchment of Wollar Creek Water Source) during year 20 of the Stage 2 mining operations. The reductions are greatest within Wilpinjong Creek adjacent to OC4. The maximum reduction in the baseflow in the Goulburn River catchment (a sub catchment of the Goulburn River Water Source) is 7ML/a, which is predicted to occur during Year 18.

Water Licence Requirements

Upper Goulburn River Water Source

Under the WM Act, MCM is required to hold a surface water licence for the predicted baseflow reductions within the Upper Goulburn River Water Source (7ML/a). According to the *Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009* (HUAWSP), there are 1,661 unit shares (ML) in the Upper Goulburn River Water Source, which provides sufficient market depth to secure the required 7ML/a water licence. MCM has confirmed that it is already in negotiations to source this licence.

Wollar Creek Water Source

Under the WM Act, MCM is also required to obtain the following licences for the predicted groundwater and baseflow take from the Wollar Creek Water Source:

- 168 ML of aquifer access licences; and
- 68 ML of unregulated river access licences.

The HUAWSP indicates that there are 1,354 unit shares (ML) of alluvial access licence entitlements in the Wollar Creek Water Source. This provides sufficient market depth to secure the required aquifer access entitlement. MCM has confirmed that it is in advanced negotiations with three individual licence holders to acquire aquifer access licences totalling 218 ML, which would be sufficient for the 168 ML/a entitlement required for the Stage 2 operations.

However, there are only 78 unit shares (ML) of unregulated river access licences for trade within the Wollar Creek Water Source, indicating that there is limited market availability of unregulated river access licences within this water source. To overcome this licencing restriction, MCM has indicated that it intends to submit an application to the NOW under Clause 72 of the HUAWSP to convert 68 unit

shares of aquifer access entitlement to unregulated river access entitlement within the Wollar Creek Water Source. This would allow MCM to account for the majority of the predicted Wollar Creek Water Source water take associated with the Stage 2 project. The proposed licence conversions would result in a small residual shortfall (18ML) in entitlement that would need to be made up through additional purchase of entitlements throughout the project life.

As discussed in Section 4.3, NOW has accepted the licence conversion approach presented by MCM and indicated that it would consider the merits of this when such an application is made.

Sensitivity Testing and Contingency Measures

NOW requested that MCM undertake further groundwater modelling to predict the absolute worst case water take from the Wollar Creek Water Source assuming a higher level of connectivity between the mine and the alluvial or palaeochannel aquifers than was previously modelled.

The modelling outcomes indicated that the maximum worst case water quantity impacts when using text book connectivity could be up to 2.3 times greater than the predicted impacts, although MCM's hydrologist considers these results to be highly improbably and unrealistic.

MCM has committed to implementing contingency measures should ongoing modelling indicate that the actual water take associated with Stage 2 modelling is greater than previously modelled.

Aquaterra's modelling indicates that prior to around Year 10 of the project the predicted alluvial groundwater mine inflows and associated baseflow reduction would be relatively small (ie. < 1 ML/a and < 10 ML/a, respectively). This is because mining would be occurring in areas distant from the alluvial aquifers and connected surface water sources. Therefore, MCM indicates that there is adequate time to monitor and remodel the effect of the project on these water sources prior to potentially higher impacts being realised.

Therefore, MCM has agreed to:

- refine its monitoring program to include additional piezometers within the alluvial areas (including palaeochannel areas); and
- undertake periodic model re-calibration, including at least two years after commencing coal extraction, then five-yearly intervals for the life of the mine.

In the event that this work shows the water table is higher than predicted, MCM has committed to either:

- permanently or temporarily trade additional water entitlements to account for the additional water take;
- implement return flows (of a suitable quality) to Wilpinjong Creek to account for the increased water take impacts on the creek; or
- investigate other reasonable and feasible mitigation measures to reduce the total direct and indirect water take.

Both the Department and NOW are satisfied with MCM's proposed strategy to deal with the potential worst case impacts of the project. Although the likelihood of these impacts occurring is low, the Department has recommended that MCM be required to prepare a detailed Surface Water Management Plan for the project, which incudes a plan to respond to any exceedances in water take predictions.

Environmental Flows

Worley Parsons indicated that open cut mining operations would reduce the volume of surface water runoff entering both the Murragamba and Eastern Creek catchments, and consequently the amount of surface runoff flowing into Wilpinjong Creek.

The Baseline Surface Water Run-off Assessment (Appendix E of the RTS on the PPR) indicates that the maximum reduction in surface water run-off from the combined catchment area, for the mean annual run-off volume would be approximately 69 ML/annum (ie. 0.19 ML/day). This would occur in Year 12 when the disturbance footprint of OC4 is at its maximum extent (ie. 15% of the combined catchment area).

Numerous submissions expressed concerns about the loss of flow to the Wollar Creek system. In response, MCM indicated that the Murragamba and Eastern creeks are low order ephemeral drainage systems that only flow in response to recent rainfall. MCM also indicated that the Murragamba and Eastern Creek catchments cover a small area (less than 6%) of the total Wollar Creek Catchment and any loss of flow would be negligible.

The Department concurs with this assessment.

Surface Water Management Systems

A conceptual water management system for managing the clean and dirty water associated with the project was included in the PPR. Numerous public submitters, the Department, NOW and the EPA were highly critical of the conceptual system, particularly in relation to ambiguities about sizing of water transfer and storage structures and the overall system design objectives.

The surface water management system was subsequently refined to incorporate detailed information on the capacity and location of proposed surface water storage dams and a detailed representation of the transfer infrastructure between the dams. The refined water management system has been designed to:

- divert clean surface water around the site via dams and drains designed to capture and convey the 100 year Average Recurrence Interval (ARI) flood;
- capture and convey dirty water runoff from disturbed or operational areas in sediment dams designed to store the 50 year ARI 72 hour storm event;
- meet a "zero" discharge objective.

In response to issues raised by Mr Gilbert, Worley Parsons tested the performance of the system for each year of six time periods against the 130 year daily rainfall record available for the Gulgong Rainfall Gauge. Worley Parsons indicates that this testing showed that there is sufficient infrastructure in the system to store the site run-off and predicted groundwater make of the project and thereby prevent uncontrolled discharges.

Mr Gilbert did not dispute this claim but noted that the maximum water volumes for some of the dams were close to their design capacity and that the system would be reliant on a relatively high rate of transfers between storages. However, Mr Gilbert believes that MCM's commitment to develop and calibrate an operational water balance model, which simulates water management storages and their interconnections explicitly, will allow for the rational ongoing development and refinement of the water management system and time as the mine develops.

The Department is satisfied that MCM has provided comprehensive information and adequate testing to demonstrate that the project can operate to avoid off-site discharges. In order to ensure this is the case, the Department has recommended conditions requiring MCM to keep an accurate water balance of the project over time, and refine the water management system throughout the life of the mine.

Creek Diversions and Realignments

To maximise coal recovery within OC4, MCM propose to mine through sections of both Murragamba and Eastern Creeks. This would require the temporary diversion of surface flows around open cut operations and progressive rehabilitation and reinstatement of these creeks in the final post-mining landform.

The EA indicates that a 1.1 km section of the central reach of Murragamba Creek, which has been identified as morphologically stable and containing beneficial ecological and archaeological characterises, would be retained. In addition, in response to a request from the Department, MCM agreed to avoid realigning a further a 2.7 km section of Murragamba Creek located immediately upstream of the morphologically stable section of the creek. This section also contains significant Aboriginal heritage sites and biodiversity values (including EECs).

The final proposal would involve realigning approximately 4.1 km of Murragamba Creek and 4.9 km of Eastern Creek within OC4 (**Figure 16**). At the Department's request, MCM engaged Worley Parsons to prepare a comprehensive Concept Design report for the proposed diversions and a flood study of the existing reaches of Murragamba and Eastern Creeks (see Appendix G of the PPR).

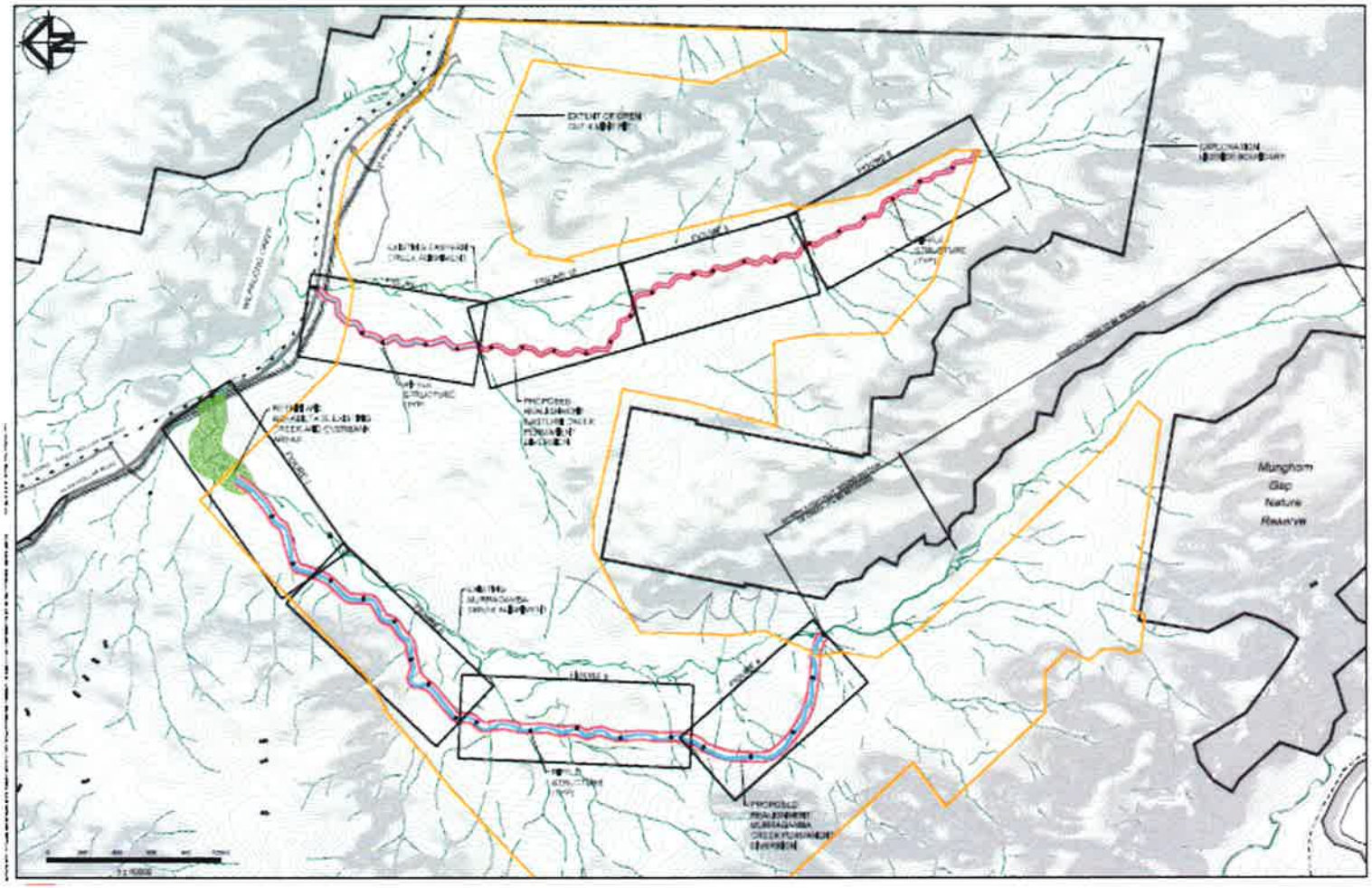


Figure 16: *Existing Catchment Surface Water Hydrology*

MCM's stated creek realignment objectives are:
- designing a morphologically stable post-mining system of creek channels linked to an active adjacent floodplain;
- preserving the existing morphological, archaeologically and ecologically significant section of Murragamba Creek; and
- to maintain and improve the existing conditions of Murragamba and Eastern Creeks.

The updated concept design report provides comprehensive information to demonstrate how these objectives would be achieved, including:
- plans documenting creek diversions, longitudinal profiles and typical cross-sections;
- hydraulic analysis of the creek diversions;
- integrations of creek diversion design with the riparian corridor ecological objectives for post mining landform;
- description of proposed staging of creek diversion works, including details of the proposed integration of the diversion works with the planned mining operations; and
- construction methodologies, materials and contingency measures.

Mr Gilbert indicates that the information provides a sound basis for assessing the creek realignment proposal. He is satisfied with the design parameters and indicates that, if effectively implemented, the realignment designs proposed would result in stable creek systems. NOW agrees with this conclusion and notes that *"Murragamba and Eastern Creeks have reaches that are heavily degraded, incised and continuing to erode"* and that *"diversion and reconstruction of stream channels is not generally supported, but may be effective in these catchments".*

The Department agrees that the concept design for the creek realignments is comprehensive and, if effectively implemented, would ensure that the creek diversions for both Murragamba and Eastern Creeks would be morphologically stable and would not impact negatively on downstream river systems. However, the Department has recommended a condition requiring MCM to prepare a detailed Water Management Plan , which includes detailed plans for the proposed creek diversion, in consultation with NOW to the satisfaction of the Director-General.

Final Void

MCM has indicated that OC4 will result in the creation of a void at the eastern end of mining operations, adjacent to the Wilpinjong Coal Mine project boundary. The void will cover a surface area of approximately 40 ha and will have a total volume of approximately 10,000ML.

Worley Parsons undertook a water balance assessment of the proposed final void, which indicates that the void is expected to lose more water due to evaporation than it would gain from rainfall and that the capacity of the void is sufficient to ensure it will not be overtopped.

Mr Gilbert indicates that the water balance dynamics of the final void would also be affected by groundwater inflows, which will change as the surrounding groundwater system recovers post-mining. He notes that as void water levels rise, evaporative losses will increase and an equilibrium level will (in theory) be reached. Mr Gilbert agrees that, as the catchment reporting to the void is relatively small and the area is naturally arid, it is likely that the void equilibrium level will be below spill level and the spill risk is likely to be low.

The Department accepts this conclusion, however has recommend a condition requiring MCM to prepare detailed plans, including design objectives, performance criteria and ongoing management of the final void, as part of the Surface Water Management Plan.

Conclusion

After detailed consideration, The Department is satisfied that the project is unlikely to have a significant impact on surface water resources in the region, and can be suitably managed to ensure an acceptable level of environmental performance.

To ensure this occurs, the Department has recommended that MCM be required to:
- ensure that it has sufficient water for all stages of the project, and if necessary, adjust the scale of mining operations on site to match its available water supply;
- operate as a "zero" discharge site;
- comply with a range of water performance measures; and

- prepare a detailed Surface Water Management Plan for the project, which includes:
  - baseline data;
  - detailed description of the water management system;
  - detailed plans for the creek realignments and void;
  - detailed performance criteria and trigger levels;
  - a program to monitor and report on the surface water impacts of the project; and
  - a contingency plan to respond to any unpredicted impacts.

5.6 Biodiversity

Issues

The project would result in the clearing of 1,534 ha of land, of which 632 ha is grassland and 902 ha is native woodland (including 123 ha of EEC). This would result in the removal or disturbance of a range of habitat for threatened fauna species.

Consideration

MCM engaged Ecovision Consulting (Ecovision) to undertake a flora and fauna assessment and Marine Pollution Research to undertake an aquatic ecological assessment for the Stage 2 project. The assessments are included as Appendix 7 of the EA.

Some concerns were raised in public submissions about the adequacy of Ecovision's flora and fauna assessment for the project. OEH also raised specific concerns about the adequacy of biodiversity surveys and taxonomic classification of some communities and species within the project area.

Dr David Robertson from Cumberland undertook a review of the adequacy of the flora and fauna assessment and additional information provided in the response to submissions. A copy of the review is included in **Appendix G**. Dr Robertson concluded that the baseline ecological information was adequate to predict flora and fauna impacts associated with the project. The Department and OEH accepted this conclusion, however OEH indicated that the vegetation community classification used differed from the classification used in OEH's Biobanking classification conventions.

Consequently, MCM engaged Cumberland to assist in reclassifying the vegetation communities within the project area to be consistent with OEH's Biobanking classification conventions. This process involved extensive consultation between Cumberland, MCM and OEH. OEH has subsequently indicated that it is satisfied with the revised community classifications adopted by MCM.

Flora

As indicated in **Table 9**, the project impact area contains 9 vegetation communities. Two of these vegetation types (totalling 123 ha) contain endangered ecological communities (EECs) and/or critically endangered ecological communities (CEECs) as defined by the NSW *Threatened Species Conservation Act 1995* (TSC Act) and the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999 (EPBC Act), respectively (referred to as EECs in the remainder of this report).

Table 9: *Summary of direct impacts on vegetation communities*

BioBanking Vegetation Type	Impact Area (ha)
Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands^	115
White Box – Yellow Box grassy woodland on basalt slopes in the upper Hunter Valley, Brigalow Belt South	8
EEC TOTAL	**123**
Grey Gum – Narrow-leaved Stringybark – Ironbark woodland on ridges of the Upper Hunter Valley, Sydney Basin***	315
Rough-barked Apple – Coast Banksia shrubby woodland on Warkworth Sands of the central Hunter Valley, Sydney Basin**	244
Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Brigalow Belt South***	101
Scribbly Gum – Brown Bloodwood woodland of the southern Brigalow Belt South**/***	84
Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin***	27
White Box – Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin***	8
Derived grasslands of the slopes on the Merriwa Plateau (secondary grasslands and shrublands)	632
NON-EEC TOTAL	**1,411**
COMBINED TOTAL*	**1,534**

*excludes cleared/exotic areas and freshwater wetland/farm dams
**Murragamba Sands Woodland in PPR
***Western Slopes Dry Sclerophyll Forest in PPR
^amalgamation of three EEC vegetation classifications from PPR
$does not have equivalent BioBanking vegetation type

As indicated in **Table 9**, the project would result in the clearing of 632 ha of secondary grasslands and shrublands and 902 ha of native vegetation (including 123 ha of EEC).

It should be noted that as a result of changes made to the project to address the Department's concerns, MCM manage to avoid the clearing of 33.5 ha of EEC. However, MCM does not believe that any further changes to the project to avoid EECs would be economically feasible.

To offset the impacts of the project, MCM is proposing to implement a detailed Biodiversity Offset Strategy (see below).

Fauna

A total of 259 vertebrate fauna species were recorded during surveys of the project area, including 170 birds, 38 mammals, 32 reptiles, 17 amphibians and 2 fish. Of these species, 36 are listed as vulnerable, endangered or critically endangered under the TSC Act (including 6 of which are also listed as vulnerable or endangered under the EBPC Act) and 7 species are listed as migratory under the EBPC Act. These 43 species included 29 birds, 9 bats and 5 other mammals.

The fauna impact assessment indicated that, without any impact mitigation or offsetting, the project would have a moderate to high impact on a number of these species, primarily due to the loss of habitat from vegetation clearing and the removal of water sources (ie. farm dams) within OC4. It is predicted that species using the valley floor would be most heavily affected. The majority of the species affected are bird species, such as the Regent Honeyeater and the Hooded Robin. The fauna assessment indicates that most of the potentially impacted species have high mobility and could readily migrate to other areas, including the adjacent Munghorn Gap Nature Reserve and the Goulburn River National Park.

To minimise the impacts on other fauna, MCM proposes to implement a range of standard management strategies including progressive clearing, pre-clearance surveys and habitat augmentation. MCM proposed that these measures would complement the key mitigation measure, which is the implementation of the biodiversity offset strategy (see below).

Aquatic Ecosystems

The aquatic assessment indicates that the surface drainage across the project area is intermittent, which results in generally poor on-site habitat potential for significant aquatic species. A total of 55 aquatic fauna taxa were recorded during the aquatic survey of the project area, comprising only 2 vertebrate (fish) and 53 invertebrate taxa. No threatened aquatic fauna listed under the EPBC Act or the *Fisheries Management Act 1994* (FM Act) were found within the study area, nor are they predicted to occur.

As described in more detail in Section 5.4, open cut mining would result in the progressive loss of 4.1 km of Murragamba Creek and 4.9 km of Eastern Creek, including removal of associated springs, swales, dams and several groundwater dependent ecosystems (GDEs).

Council expressed concerns about the loss of the GDEs. In its response to submissions, MCM indicated that the majority of GDEs to be lost are degraded and do not support species of conservation significance. Only one of the two larger spring-fed GDEs located near the confluence of Eastern and Wilpinjong Creek would be lost as a result of mining. The other GDE, which is located on Property 44 at the head of Eastern Creek, will be conserved within the Powers Conservation Area (see Section 5.8 below).

In addition, MCM has committed to:

- progressively restore aquatic and riparian ecological function of the diverted sections of both Murragamba and Eastern Creek systems (refer to Section 5.4);
- include compensatory aquatic habitat areas in the rehabilitated lands; and
- rehabilitate degraded riparian areas along Wilpinjong Creek and along Murragamba and Eastern Creeks downstream of the mined areas.

The Department and Fisheries NSW support these commitments and the Department has recommended that the aquatic rehabilitation measures be included in a condition for the project.

Rehabilitation Strategy

The EA included broad strategies that MCM proposed to adopt to progressively rehabilitate the lands that would be cleared for the construction of surface infrastructure, and open cut mining operations. MCM has also committed to revegetating all other cleared land it owns within the project boundary but outside the mine disturbance footprint. This is discussed in more detail under the next sub-heading below.

The Department engaged Dr Mark Burns to review the acceptability of the rehabilitation strategies contained in the EA. Mr Burn's review report is attached as **Appendix G**. Dr Burns concluded that the rehabilitation strategies contained in the EA were not based on sound ecological principles and were deficient in both detail and logical procedure.

At the request of the Department, MCM prepared a revised Rehabilitation Strategy (refer to the RTS report and Appendix K of the PPR), which includes rehabilitation objectives and principles, schedules, landform designs, erosions and sediment controls, site preparation and revegetation techniques, performance criteria, and monitoring and maintenance strategies. Dr Burns indicated that the revised Rehabilitation Strategy provides a sound basis and sufficient detail to give a clear picture of the strategy that the mine intends to employ during the different stages of rehabilitation.

The Strategy indicates that MCM will rehabilitate 1,502 ha of the land that would be cleared as a result of the Stage 2 operations (excluding the final void) to forest and woodland communities, including 631 ha that are currently degraded secondary grassland.

The final proposed rehabilitated landform is shown in **Figures 6** and **7**. It is MCM's objective that the final rehabilitated landform will create a natural looking, stable and well drained post-mining landform that is visually consistent with the surrounding areas.

The Rehabilitation Strategy indicates that at mine closure, the rehabilitated Stage 2 area will be used for ecological values, providing connectivity with the Goulburn River National Park, Munghorn Gap Nature Reserve and Cope State Forest, and potentially for the purposes of passive recreation. MCM has committed to securing all the rehabilitated land in perpetuity for conservation.

The Department is satisfied that the Rehabilitation Strategy provides a sound basis for achieving successful overall rehabilitation outcomes for the project. In addition, the Department is satisfied that, in the longer term, the rehabilitated lands would provide valuable linkages of woodland vegetation between existing conservation areas.

The Department has recommended that information contained in the strategy be expanded upon in a detailed Rehabilitation Management Plan, to be prepared in consultation with relevant agencies and aimed at achieving defined rehabilitation objectives.

Biodiversity Offset Strategy

MCM engaged Cumberland to prepare a biodiversity offset strategy that, together with the rehabilitation strategy, is directed toward reducing the biodiversity impacts of the project (refer to **Appendix F**).

The biodiversity offset strategy comprises 8 biodiversity areas, totalling approximately 4,066 ha of native vegetation, including 1,168 ha of EEC. The final biodiversity strategy is summarised in **Table 10** below and the location of each offset area in relation to the project is shown on **Figure 17**.

Table 10: *Biodiversity Offset*

Offset Area	Native Vegetation (ha)	EEC (ha)	Total (ha)
Dun Dun East	653	394	1,047
Dun Dun West	848	111	959
Avisford1	300	102	402
Avisford2	169	39	208
Ulan	290	48	339
Onsite Offset	390	53	443
Old Bobadeen	84	406	490
Libertus	163	15	178
Offset Totals	**2,897**	**1,168**	**4,066**
Disturbance Area	**1,411**	**123**	**1,502**
Offset Ratio	**1:2.1**	**1:9.5**	**1:2.7**
Rehabilitated lands	1379	123	1502
Offset Total (with rehabilitation)	**4,276**	**1,291**	**5,568**
Offset Ratio (with rehabilitation)	**1:3.0**	**1:10.5**	**1:3.6**

NOTES:

- *In accordance with requirements of OEH, the Avisford 1 property has been discounted by 20% due to an existing covenant on the property under the Conveyancing Act 1919 which prohibits certain activities on the land, including clearing.*
- *In accordance with requirements of OEH, the northern portion of the Dun Dun East property (ie. Lot 80 totalling 729 ha) has been removed from the offsetting strategy.*

The biodiversity offset would result in offset ratios of 1:2.1 for native vegetation and 1:9.5 for EEC communities, with an overall offset ratio of 1:2.7.

OEH considered that the forest types within the northern portion of the Dun Dun East offset area (totalling 729 ha) were overrepresented in the offset strategy considering that such vegetation is not impacted by the project. OEH recommended that this area be excluded from the package. This exclusion is reflected in the offset figures in **Table 10**. Notwithstanding, Cumberland Ecology argues that this forest type is part of a contiguous block of forest that has a wide variety of native flora and fauna, and MCM has indicated its intention to conserve the 729 ha area in perpetuity.

In addition as discussed above, MCM has committed to protecting rehabilitated mine areas for in perpetuity conservation after mining. This would ultimately result in the long-term protection of approximately 5,568 ha of native vegetation to offset the 1,534 ha that would be cleared (ie. a gross long term offset ratio of 1:3.6), including approximately 1,291 ha of EEC vegetation to offset the 123 ha that would be cleared (ie. a gross long term EEC ratio of 1:10.5).

Throughout the assessment process OEH, Council and a large number of special interest groups and public submitters raised concerns about the impact of the project on biodiversity and the inadequacy of the original biodiversity offset. Key criticisms of the biodiversity offset included:

- the offset does not include conservation of the area known as "the Drip" and the "Corner Gorges";
- the quantum of the offset is inadequate;
- offsets do not achieve an biodiversity gain;
- the offset areas are not in the same area as the project;
- offsets do not provide connectivity to other conservation areas; and
- offsets are not "like for like".

A discussion on how the offset strategy has been revised throughout the assessment process to address these issues is provided below.

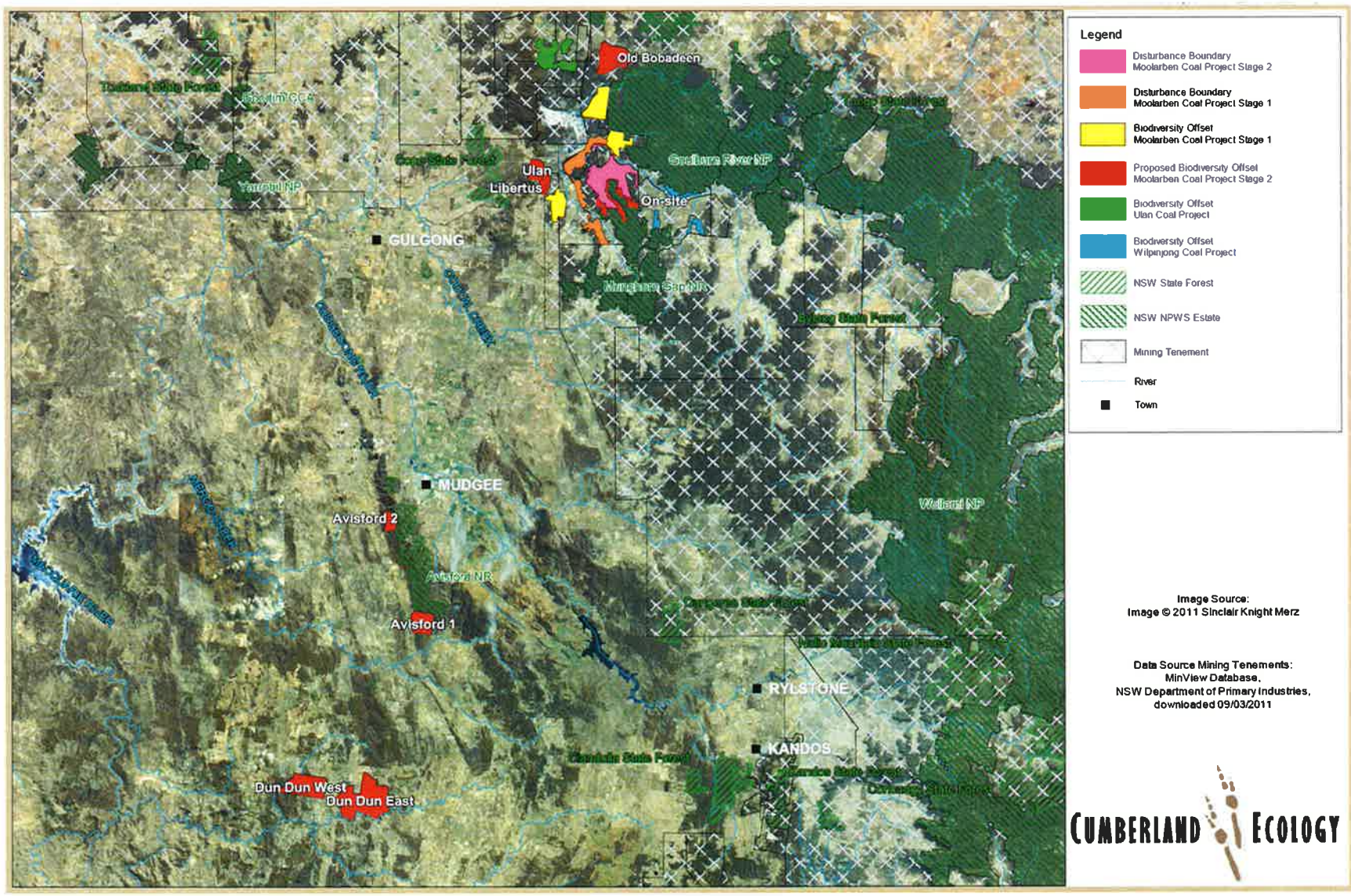


Figure 17: *Location of Biodiversity Offset Areas*

"The Drip"
One of the most contentious issues raised by special interest groups and public submitters was that the areas known as "the Drip" and the "Corner Gorges" were not included in the biodiversity offset. This issue was also raised by OEH.

These features are located on MCM owned land along the Goulburn River, approximately 500m to the north and 450m to the northeast (respectively) of the approved underground mining domain (UG4) associated with Stage 1 of the project. "The Drip" area contains rock formations that drip spring water that seeps through the overhanging porous rocks. The "Corner Gorge" is series of gorges located on a bend of the Goulburn River.

Council and many special interest groups consider these areas to be nationally significant for their cultural, scientific, scenic, educational and tourist values.

The Department notes that the Stage 1 offset strategy commits MCM to formally "enhance and conserve" these areas by 2028. However, in response to the strong interest and support from the community for these areas to be formally protected and incorporated into the adjacent Goulburn River National Park, MCM has agreed to dedicate these areas into National Park.

The Department has confirmed that the Reserve Referral Process under the *National Parks and Wildlife Act, 1974* has been initiated for incorporation of these areas, as well as adjacent Crown Lands, into the National Park reserve. The OEH has indicated that the details of the transfer are still being negotiated with MCM and the other government agencies involved.

Quantum of Offset
OEH and numerous special interest group and pubic submitters raised concerns about the inadequacy of the total area of land proposed for offsetting and indicated that it would not compensate for the area to be cleared for mining and related purposes.

In response to this issue, and following extensive consultation between OEH and the Department, MCM agreed to include significant additional areas to the offset, including the Avisford 1 and 2, Old Bobadeen and Libertus Lot 7 properties which cover a total of 1,278 ha and represents a 46% increase in the area of land to be offset when compared to the original area.

As indicated previously, the Department is satisfied that these additional areas result in offset ratios for native vegetation which are generally equivalent to those recently approved for other mining projects, and that the ratios for EECs are higher than most recently approved projects.

Biodiversity Gains
The Department and OEH raised concerns that the original offset strategy did not provide adequate "biodiversity gain" to compensate for the impacts of the project on the biodiversity of the region.

In order to address this issue, at the request of the Department and OEH, MCM agreed to regenerate a total area of 1,531 ha within the offset areas from existing cleared and disturbed grasslands to ecologically sustainable woodland. The areas of grassland that would be generated to woodland communities within each offset area are indicated in **Table 12**. The regeneration areas are generally located on the lower slopes of the offset areas, between the existed vegetated slopes and creeklines where grazing activities has results in land clearing and degradation.

Table 12: *Grassland Areas within each Offset to be Regenerated to Woodland*

Offset Property	Area of Grassland Proposed to be Regenerated to Forest / Woodland (ha)
Dun Dun East	380
Dun Dun West	344
Avisford 1	9
Avisford 2	-
Ulan 18	178
On-site	189
Old Bobadeen^	409
Libertus*	22
TOTAL	**1,531**
*includes 21 ha of exotic grassland to be regenerated in Libertus ^ includes 23.5 ha of exotic grassland to be regenerated in Ex-Williams	

The Department and OEH are satisfied that the regeneration of these areas would provide clear biodiversity gains. The Department has recommended a condition requiring MCM to prepare a Biodiversity Management Plan to guide the regenerative works, and include detailed performance and completion criteria.

To ensure the regenerative works meet the defined performance and completion criteria, the Department has recommended a condition requiring MCM to engage a suitably qualified, experienced and independent person to undertake an audit of the regeneration areas within the biodiversity offset strategy at the end of mining operations. If this audit identifies that the regenerated areas do not meet specific performance and completion criteria, then MCM will be required to augment the offset strategy.

Location and "Connectivity" of Offset Areas
OEH and several public submitters raised concerns that several of the biodiversity offset areas (including the Avisford and Dun Dun properties) are relatively removed from the disturbance area and are located in different catchment management areas (CMAs) and bioregions. OEH also raised concerns that the original offset areas were isolated and did not provide sufficient connectivity to existing conservation areas or provide adequate ecological corridors.

In response to these concerns and a request from OEH, MCM agreed to add the Avisford 2 offset area to the offset strategy. Together with the Avisford 1 area, this resulted in an additional 611 ha of land being added to the Avisford Nature Reserve.

In addition, as discussed above, MCM subsequently added both the Old Bobadeen and Lot 7 DP47521 offset areas to the offset package. These areas add a total of 668 ha of land within the same CMA as the impact area and which link to other areas of intact vegetation.

Cumberland acknowledged that both the Dun Dun East and West properties are removed from the disturbance area and in a different bioregion, however Cumberland considers that these areas [which cover 1,047 ha including Lot 80 and 959 ha respectively) are large enough to be considered conservation areas in their own right. Cumberland also pointed out that a large portion of the offsetting areas (totalling 1,449 ha) are either adjacent to or in close proximity to the disturbance area and that these areas would assist in providing connections to regional conservation areas including the Goulburn River National Park, the Munghorn Gap Nature Reserve and the Cope State Forest.

The Department does not object to some of the offset areas being located away from the disturbance area, and notes that this is becoming more common in mining projects due to limited suitable land being available adjacent to mine sites, and the fact that large areas of land are under existing mining tenement and long term conservation cannot be assured. The Department is satisfied that the other offset areas are located either adjacent to or in the vicinity of the impact area and are well situated to provide either direct connectivity or a "stepping stone" to existing conservation areas.

Finally, the Department is satisfied that MCM's commitment to rehabilitate the impact site and protect the site in perpetuity would provide valuable linkages between Munghorn Gap Nature Reserve and the Goulburn River National Park.

"Like for like"
Information provided by Cumberland indicates that suitable habitat exists within the offset areas for all of the 43 threatened fauna species that are predicted to be impacted by the project.

However, OEH noted that only relatively small areas of high value habitat for woodland birds is currently included in offset properties in close proximity to the impact area and that the areas to be regenerated will have considerable lag time before they can be potentially occupied by many of the woodland birds.

To address this issue, OEH recommended that MCM be required to consider mitigation measures to reduce the immediate impact on woodland bird species, in particular the Regent Honeyeater. OEH indicated that this could be in the form of support to the National Regent Honeyeater Recovery Team, which is currently implementing a number of actions to assist in the recovery of this species.

MCM has provided a detailed response to this recommendation, arguing this is unnecessary (see **Appendix F**). The response indicates that additional targeted ecological surveys at the offset properties, which were completed in 2013, have provided substantial information regarding threatened species in the offset areas, including the Regent Honeyeater (refer to **Appendix F**).

Specific outcomes of these surveys in relation to the Regent Honeyeater confirm that a total of 1,744 ha of regent Honeyeater habitat is present within the offset areas, compared with a conservative estimate of 685 ha of potential habitat in the Stage 2 disturbance area.

In addition, MCM has committed to regenerate grassland areas within the offset areas to woodland using species typical of the White Box Yellow Box Blakely's Red Gum Woodland EEC, which are recognised habitat for the Regent Honeyeater. MCM indicates that this will increase the area of habitat for the Regent Honeyeater that is conserved/created by an additional 1,160 ha, resulting in a total of 2,904 ha of habitat in the offset areas in the medium to long term.

Furthermore, MCM indicate that the potential area of Regent Honeyeater habitat would be further increased by commitments to revegetate 1,502 ha of the Stage 2 disturbance area to a mosaic of forest and woodland with species typical of the White Box Yellow Box Blakely's Red Gum Woodland EEC. This would result in a total of 4,406 ha of known and potential Regent Honeyeater habitat in the medium to long term, which MCM argues is more than adequate to compensate for potential impacts to this species as a result of the project.

The Department is satisfied that significant areas of habitat for the Regent Honeyeater existing in the offset areas, and has recommended conditions requiring the regeneration of vegetation within the offset areas to be focused on the re-establishment of flora species typical of EECs which are know habitat for the Regent Honeyeater.

In relation to vegetation communities, Cumberland acknowledged that the biodiversity offset areas do not contain the same combination of vegetation communities as the disturbance area, and that several of the communities that would be impacted are not represented in the offset areas.

The lack of "like for like" vegetation was raised as an issue by OEH and several other submitters and resulted in significant changes to the original offset package, including the addition of two offset areas (ie. Old Bobadeen and Libertus Lot 7). Cumberland confirmed that these offset areas, which total 688 ha of additional native vegetation, include broad areas of grassland that are equivalent or better than the valley floor grassland within the impact area.

Table 11 provides a comparison of the vegetation communities that would be removed in the disturbance area against the vegetation communities represented in the final offset areas.

Although the EEC communities are well represented in the offset areas, 3 communities (ie. Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin, Scribbly Gum – Brown Bloodwood woodland of the southern Brigalow Belt South and Rough-barked Apple – Coast Banksia shrubby woodland on Warkworth Sands of the central Hunter Valley, Sydney Basin) are either not represented or significantly under represented and 12 communities (including 3 EEC communities) are not represented in the impact area but are well represented in the offset areas.

In order to specifically address this disparity in the longer term, MCM has committed to rehabilitate the impact area with 1,502 ha of the woodland communities which are either not represented or are under represented in the offset areas.

In addition, as discussed above, MCM has also committed to regenerate a total area of 1,531 ha within the offset areas from existing cleared and disturbed grasslands to ecologically sustainable woodland.

Both the Department and OEH are satisfied that the final offset strategy would adequately compensate for all vegetation communities in the medium to longer term.

Table 11: *Comparison of Vegetation Communities in the Disturbance and Offset Areas*

BioBanking Vegetation Type	Disturbance Area (ha)	Offset Area/s (Ha)
Blakely's Red Gum – Yellow Box grassy open forest or woodland of the New England Tablelands^	115	38
White Box – Yellow Box grassy woodland on basalt slopes in the upper Hunter Valley, Brigalow Belt South	8	802
Yellow Box – Blakely's Red Gum grassy woodland of the Nandewar Bioregion	-	303
White Box – Rough Barked Apple alluvial woodland on the NSW western slopes	-	35
White Box grassy woodland of the Nandewar and Brigalow Belt South Bioregions	-	5
EEC TOTAL	**123**	**1,182**
Grey Gum – Narrow-leaved Stringybark – Ironbark woodland on ridges of the Upper Hunter Valley, Sydney Basin***	315	144
Rough-barked Apple – Coast Banksia shrubby woodland on Warkworth Sands of the central Hunter Valley, Sydney Basin**	244	2
Slaty Box – Grey Gum shrubby woodland on footslopes of the upper Hunter Valley, Brigalow Belt South***	101	47
Scribbly Gum – Brown Bloodwood woodland of the southern Brigalow Belt South**/***	84	4
Grey Box – Narrow-leaved Ironbark shrubby woodland on hills of the Hunter Valley, North Coast and Sydney Basin***	27	-
White Box – Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin***	8	4
Derived grasslands of the slopes on the Merriwa Plateau	632	189
Red Stringybark – Scribbly Gum – Red Box – Longleaved Box shrub – tussock grass open forest the NSW South Western Slopes Bioregion	-	2,074
Narrow-leaved Ironbark shrubby open forest on hills of the central Hunter Valley, Sydney Basin	-	226
Red Stringybark woodland of the dry slopes of the South Western Slopes Bioregion	-	168
Dwyer's Red Gum woodland on siliceous substrates in the Brigalow Belt South Bioregion	-	62
Black Cypress Pine shrubby woodland of the Brigalow Belt South Bioregion	-	32
Heathy shrublands on rocky outcrops of the western slopes	-	32
White Box – Red Stringybark shrubby woodlands on basalt slopes of the Nandewar and Brigalow Belt South Bioregions	-	28
River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions	-	17
Low Diversity Derived Native Grassland[a]	-	586
NON-EEC TOTAL	**1,411**	**3,612**
COMBINED TOTAL*	**1,534**	**4,794**

*excludes cleared/exotic areas and freshwater wetland/farm dams
**Murragamba Sands Woodland in PPR
***Western Slopes Dry Sclerophyll Forest in PPR
^amalgamation of three vegetation classifications from naming used in PPR
[a]does not have equivalent BioBanking vegetation type

Conclusion

The Department is satisfied that MCM has investigated all reasonable and feasible measures to avoid and/or minimise the biodiversity impacts of the project, and that the vegetation clearing is justified in this instance to enable the extraction of the coal resource.

The Department is also satisfied that the implementation of the biodiversity offset strategy, coupled with the rehabilitation 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.

To ensure this occurs, the Department has recommended that MCM be required to:

- implement the biodiversity offset strategy and rehabilitation strategy;
- provide suitable habitat for the threatened fauna species confirmed and identified as being potentially present in the disturbance areas;
- provide for the in perpetuity conservation of the offset areas and the rehabilitated mine area;
- develop a comprehensive Biodiversity Management Plan and Rehabilitation Management Plan; and
- lodge a substantial conservation and biodiversity bond to ensure that the offset areas are established and maintained to the satisfaction of the Director-General.

5.7 Transport

Issue
The project would increase the level of traffic on the local road network, and increase the number of coal train movements on the Gulgong to Sandy Hollow Railway Line.

Consideration
The EA includes traffic and rail impact assessments of the project, which were carried out by Sinclair Knight Merz (see Appendix 13 and 14 of the EA respectively).

Road Traffic
The maximum traffic generation for the project would occur during Year 19 of operations, when there would be a peak workforce of 122 workers associated with Stage 2 and 317 workers associated with Stage 1. The Stage 2 increase in daily traffic volumes on the local road network during this period is predicted to result in an additional 8% of daily traffic on Ulan Road, 6% on Cope Road and 23% on Ulan-Wollar Road. The peak number of vehicles would occur on a weekday between 6am and 7am, when 207 people would arrive on site for day shifts.

The traffic impact assessment indicates that the additional traffic associated with the Stage 2 project is still within the RTA's level of service that is considered satisfactory for two-lane rural roads such as Ulan, Cope and Ulan-Wollar Roads.

Council and a number of community submissions raised concerns about the impact of increased traffic on Ulan Road and other local roads as a result of the Moolarben mining complex operating in conjunction with the Ulan and Wilpinjong mines.

Ulan Road
The impact of cumulative mine-related traffic on local roads, and in particular Ulan Road, has been raised as an issue during previous project applications for the three mines. As discussed in Section 4.3 of this report, to address this the Department included a condition in both the Ulan and Wilpinjong project approvals requiring the mines, in conjunction with MCM, to prepare the URS.

The URS was finalised by specialist transport consultants, Arrb Group Ltd in December 2011. However, the Council and mines did not agree on the outcomes of the URS, in particular the apportionment of costs to upgrade and maintain the road, and the matter was referred to the Director-General for resolution.

After a long and difficult dispute resolution process, which involved an independent review of the URS and extensive consultation with all parties, the Director-General made a determination on the URS on 25 May 2013. Implementation of the URS involves upgrade of Ulan Road and the intersections and maintenance over a 20 year period. The works will be jointly funded by the three mines and Council. Council and the mining companies are currently in the process of completing the necessary arrangements for delivery of the URS, which involves a binding commercial agreement between the parties.

The Department is satisfied that implementation of the recommendations of the URS will ensure that Ulan Road is upgraded and maintained to a safe standard and that residences experiencing exceedances of the road traffic noise criteria are adequately managed. The Department has recommended a condition requiring MCM to implement the agreement.

Other Local Roads
The Department is satisfied that the predicted daily traffic increase on Cope Road as a result of the project is minor (ie. 6% increase) and would not adversely affect road's level of service. The Department notes that the majority of traffic on Cope Road is attributed to Ulan mine's operations and that Ulan is required to provide funds to Council for the ongoing maintenance of this road. Irrespective, the Department notes that MCM has agreed to pay Council an annual financial contribution for the ongoing maintenance of Cope Road associated with the Stage 2 project. The total contribution amount proposed is $480,000 which would be paid in annual instalments of $120,000 for the first 4 years of mining operations.

In relation to Ulan-Wollar Road, the Department acknowledges that the predicted increase in daily traffic numbers along this road is more significant (ie. 23%). However, the additional traffic would be concentrated along the western section of Ulan-Wollar Road (ie. between Ulan Road and the proposed new site entrance – see below) which has already been upgraded to an acceptable level of service to deal with the additional traffic. Furthermore, MCM has confirmed that all privately owned properties with road access to this section of Ulan-Wollar Road are now mine owned. The Department is therefore satisfied that the additional traffic on the western section of Ulan-Wollar Road would not impact on the safety or performance of the road.

The Stage 2 project involves the construction of an additional site access intersection on Ulan-Wollar Road, approximately 4.7 kilometres east of its junction with Ulan Road. The traffic impact assessment indicated that this would require vegetation to be cleared to the west of this access point to improve sight distances and the reduction in the speed limit from 100km/hr to 70km/hr along this section of road. MCM has committed to submitting applications to both RMS and Council to facilitate these works. The Department is satisfied that the additional site access is required to provide access to the Stage 2 project areas and has recommended a condition requiring the intersection to be constructed, operated and maintained to the satisfaction of Council.

In addition, the Stage 2 project involves the realignment of a 1 kilometre section of Ulan-Wollar Road approximately 7.5 kilometres east of the intersection with Ulan Road. The Department is satisfied that this realignment is required for safety reasons (ie. to move the existing road away from the extraction area).

The Department notes that Council raised concerns about the sub-standard condition of a section of Ulan-Wollar Road, which was recently re-aligned by a private contractor on behalf of MCM. In order to avoid sub-standard road works in the future, Council requested that the two sections of Ulan-Wollar Road that require realignment as part of the Stage 2 project be undertaken by Council. The Department understands that MCM tenders for road related works in accordance with company policy, which provides an opportunity for Council to bid for the works. The Department believes this is an appropriate procurement process, but notes that it does not play a role in these matters.

MSC also expressed concern about the assumptions used in the traffic impact assessment for mine-related traffic on Bylong Valley Way and requested that the Department impose a condition prohibiting the use of that road by MCM mine-related traffic. In response, MCM undertook a survey of its existing workforce which indicated that 11% (ie. 24 employees) of employees live outside the Mudgee/Gulgong areas and that of these, only 7 employees use Bylong Valley Way to travel to and from the mine. A similar portion of the Stage 2 workforce is expected to use the Bylong Valley Way (ie. about 4 employees). The Department is satisfied that this level of traffic is very low and would not adversely impact the safety or capacity of Bylong Valley Way. Therefore, the Department does not believe that it is necessary to prohibit mine-related traffic on this road.

Road Closures

The traffic impact assessment indicates that several minor local roads, including Carrs Gap and Murragamba Creek Roads would be closed as part of the project. The owner of one privately owned property raised concerns that the closure of Carrs Gap Road would restrict access to their property. In its response, MCM committed to maintain access to privately-owned properties wherever possible or, where necessary, to ensure that alternative access is provided. The Department is satisfied with this approach.

The Department is satisfied that with the implementation of the above measures, the project is unlikely to have a significant impact on the safety or capacity of the surrounding road network.

Rail Traffic

MCM currently loads an average of 4 coal trains per day on its dedicated rail loop and rail load out facility and transports the coal to markets in the east via the Gulgong to Sandy Hollow Railway Line. The additional product coal generated by the Stage 2 operations would require an additional one laden train per day to be transported on this line.

As discussed in detail in Section 5.1 of this report, the railway line currently has sufficient capacity to cope with the project's rail traffic, but would need to be upgraded over the next few years to accommodate the trail traffic associated with the growth of mining in the region. The ARTC has

already developed plans for these upgrades, and is progressively implementing them. If these plans are not fully implemented, and there is subsequently a shortage of rail capacity for MCM, then the Department notes that MCM would need to adjust the scale of operations to match the available supply.

Conclusion

The Department is satisfied that with the implementation of suitable mitigation measures, including the recommendations of the URS, the transport impacts of the project are likely to be minor.

To ensure this is the case, the Department has recommended conditions requiring MCM to:

- construct, operate and maintain the site access on Ulan-Wollar Road to the satisfaction of Council; and
- implement the Director-General's requirements in relation to the URS, in conjunction with Council, Ulan and Wilpinjong coal mines.

5.8 Aboriginal Heritage

Issue

The project would have a direct impact on 148 known Aboriginal sites, and could affect a range of other sites of Aboriginal cultural significance.

Consideration

The EA contains an Aboriginal heritage assessment that was carried out by Archaeological Risk Assessment Services (ARAS) in consultation with local Aboriginal groups (Appendix 9 of the EA). In response to issues raised by the Department, MCM subsequently engaged AECOM to review parts of this assessment and undertake an additional assessment relevant to the preferred project. This report is provided as an addendum to the original Aboriginal heritage assessment and is included in Appendix J of the PPR.

The assessments included over 42 days of archaeological survey in the Stage 2 area and extensive consultation with the five registered Aboriginal stakeholder groups. Consultation as part of the EA was undertaken in accordance with the *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, 2005), while the consultation undertaken as part of the PPR was conducted in accordance with the more recent *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (DECCW, 2010). Consultation included a number of meetings, letters and stakeholder attendance during surveys.

The Department and OEH are satisfied with the level of assessment undertaken in relation to Aboriginal heritage. In addition, the Department is satisfied that the scope and extent of consultation with the Aboriginal stakeholders during both the original assessment and the preferred project addendum was adequate.

The assessment indicates that a total of 471 sites were located within or adjacent to the Stage 2 project boundary (refer to **Figure 17**). The majority of the sites comprise isolated stone artifact finds and scatters, however several rock shelter and potential archaeological deposits (PADs) were also identified.

Approximately 85% of sites and isolated finds were located within the valley floors, alluvial floodplains or drainage channels within the Stage 2 area. The remaining 15% of recorded sites and isolated finds were located on elevated features such as ridge crests, knolls, saddles or on spurs. This evidence of site occupation is reflected across the region, with past studies confirming that environmental factors such as access to permanent water, availability of dry flat ground and avoidance of cold air drainage influence where sites have been found.

As clearly shown on **Figure 17**, the greatest evidence for Aboriginal occupation in the Stage 2 area is concentrated within the Murragamba Creek Valley and surrounding low ridges. This area contains sites with the richest and most diverse surface stone artifact assemblages. Five highly significant artifact scatters and PADs (S2MC043, S2MC054, S2MC062, S2MC063, S2MC064) and one highly significant grinding groove site (S2MC261) were recorded along a 1.75 kilometre section of Murragamba Creek.

Another area indicating evidence of occupation is within the Eastern Creek Valley where two highly significant artifact scatters and PADs (S2MC123 and S2MC124) were recorded.

Other dominant landscape features within the Stage 2 area that show evidence of Aboriginal occupation are the sandstone ridges located above the UG1 and to a greater extent the UG2 areas. Three highly significant artifact scatters with rock shelters and PADs (S2MC231, S2MC236 and S2CM38) were identified in these areas. One site (S2MC236) contains painted rock art images, which are considered to be regionally significant.

Impacts
The assessment indicates that 148 sites within the stage 2 project area would be permanently removed by open cut mining, infrastructure construction/upgrade activities and the northern out-of-pit emplacement area. A further 8 sites are predicted to be indirectly impacted from subsidence or blasting-related vibration associated with open cut mining. The remaining 315 sites are located outside of the disturbance areas and would not be impacted by the project.

Of the directly impacted sites, 4 were assessed to be of high archaeological significance, 13 of medium significance and 131 of low significance. Of the indirectly impacted sites, 2 were assessed to be of high archaeological significance, 1 of medium significance and 5 of low significance.

Three of the highly significant sites that would be removed are artifact scatters with PADs (S2MC043, S2MC124 and S2MC124) located within OC4. One site (S2MC231) is a rock shelter site located in the out-of-pit emplacement area above UG1. The Department requested that MCM provide further justification for removal of this site. In response, MCM's archaeological consultant (South East Archaeology) indicated that the nature of the site is comparable to numerous others recorded in the region and that no specific aspects of the site are rare or unique. Avoidance of this site was therefore considered unfeasible on engineering and economic grounds.

Avoidance, Conservation and Management
MCM developed a multi-faceted approach to avoid, conserve and manage Aboriginal heritage sites within the project area.

In terms of avoidance, the Department notes that the design changes associated with the preferred project (particularly around Murragamba Creek) resulted in a reduction in impacts to 14 sites (including 4 highly significant sites) when compared to the original project. In addition, in response to a request by the Department, MCM committed to extending each of the Aboriginal heritage conservation areas, which has resulted in an additional 30 sites (including 2 highly significant sites) being conserved. Importantly, MCM also committed to retaining a block of coal in UG2 beneath Cliff 7 in order to avoid impacts to the highly significant rock shelter site that contains rock art (S2MC236).

In terms of conservation, MCM committed to conserving in perpetuity up to 92 sites in 3 conservation areas, including:

- *Murragamba Creek Conservation Area* – conserve a section of Murragamba Creek in order to protect 40 sites - 5 of high significance, 6 of medium and 29 of low;
- *Powers Conservation Area* – conserving an area on Property 44 at the head of Eastern Creek valley in order to protect 10 sites – 1 of high significance, 2 of medium and 7 of low significance; and
- *Red Hills Conservation Area* – conserving an area on Property 14, along the riparian corridor of Wilpinjong Creek in order to protect 42 sites – 2 of high significance, 9 of medium and 31 of low significance.

The location of these avoidance and conservation areas are shown in **Figure 17**.

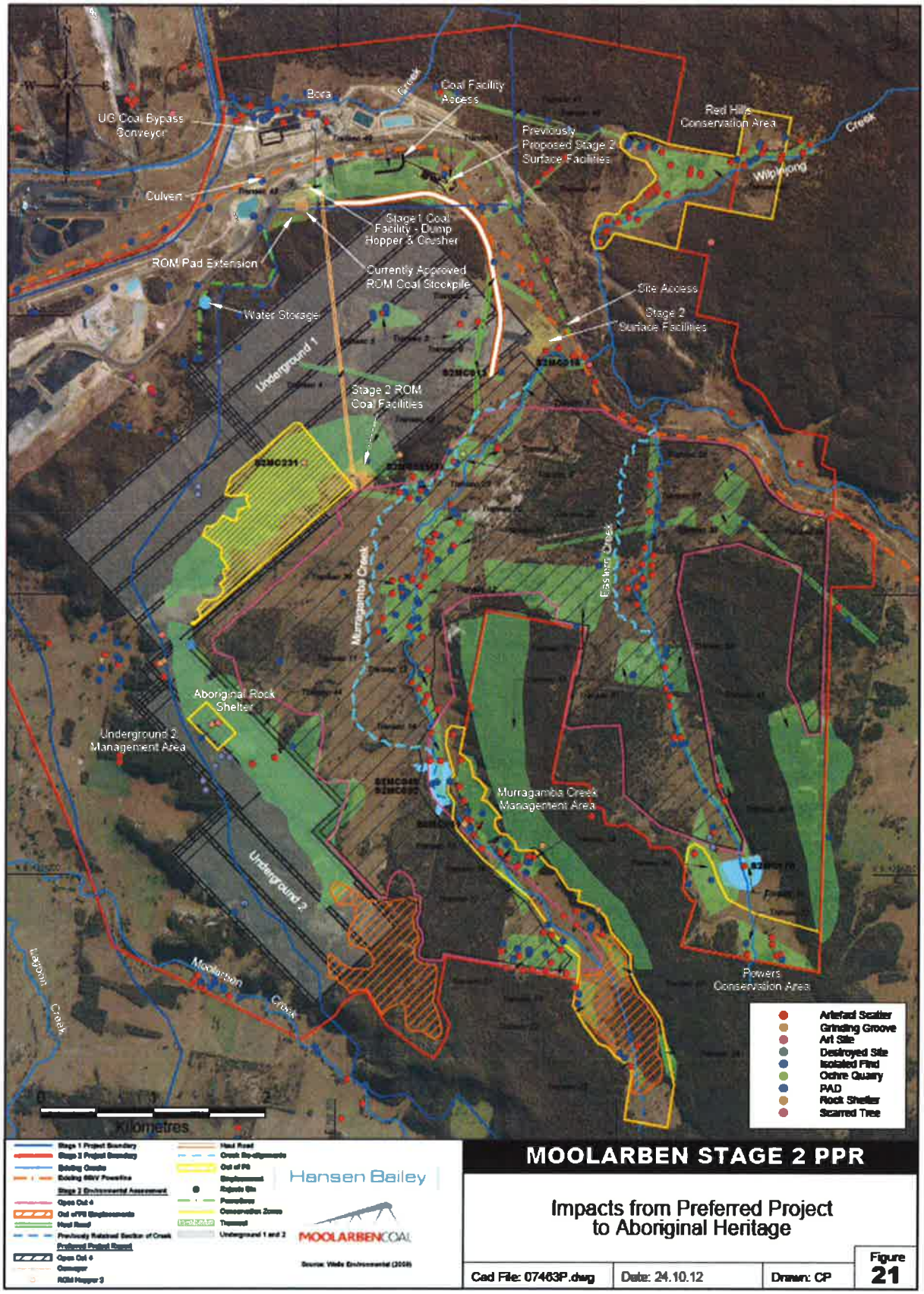


Figure 17: *Aboriginal Heritage Sites and Conservation & Management Areas*

The Department is aware that the Muarragamba Creek and Powers Conservation Areas are also proposed as biodiversity offsets (refer to Section 5.6 above) for the Stage 2 project and that MCM has committed to enhance and conserve part of the Red Hills Conservation Area as part of its Stage 1 biodiversity offset[1].

The Department and OEH do not object to the protection of these areas for the dual purpose of biodiversity and Aboriginal heritage conservation. MCM has made a range of commitments to ensure that any vegetation enhancement works within these areas do not impact on Aboriginal heritage sites.

The Department and OEH support the revised archaeological avoidance, conservation and management package and the Department has recommended a condition to ensure the conservation areas are protected in perpetuity.

In addition, MCM proposes to implement a range of measures to monitor, manage and record the remaining Aboriginal heritage sites. These measures were developed in consultation with the local Aboriginal community. Amongst others, the measures include monitoring three additional rockshelter sites (S2MC229, S2MC232 and S2MC233), which are located outside of the OC4 mining operations but which have been identified as potentially being impacted by blasting. The Department has recommended a condition to ensure that blasting operations do not damage these Aboriginal rockshelter sites.

OEH identified that two areas (ie. the northern section of the Haul Road and the Stage 2 ROM Coal Facilities) were not surveyed as part of either the original assessment or the assessment associated with the preferred project. The Department has therefore recommended that MCM survey these areas prior to development and include any methodologies for the protection, mitigation and/or management measures in a Heritage Management Plan.

Many of the submissions from the public and special interest groups expressed concerns about the potential impact of the project on the cultural heritage values of "the Drip". However, as indicated previously, the project would not impact on this area and would therefore have no effect on its cultural heritage values.

Numerous submissions from the public and special interest groups also expressed concerns about the number of Aboriginal heritage sites that would be impacted and the cumulative destruction of sites in the region. In its response, MCM reiterated that of the 471 sites within the project area, 315 are located outside of the disturbance areas and would not be impacted. The Department also notes that significant conservation areas in the vicinity of the project, including the Munghorn Gap Nature Reserve and the Goulburn River National Park, are likely to contain similar and representative heritage evidence to that identified within the project area.

The Department is therefore satisfied that existing regional conservation areas, and the proposed Murragamba, Powers and Red Hills Conservation Areas would provide long-term protection of a representative sample of Aboriginal heritage sites identified as significant from a cultural heritage perspective.

To further address cumulative impacts of mining operations on Aboriginal heritage sites, OEH indicates that it is appropriate to gather additional scientific and cultural information about Aboriginal heritage sites in the region. To this end, OEH recommended that Moolaben be required to resource the Aboriginal community to survey and record Aboriginal cultural information in areas selected for biodiversity offsets specifically in the vicinity of Pyramul Creek, located in the southern portion of the Dun Dun East biodiversity offset (Lot 79, DP 704159).

The Department believes that adding information to the Aboriginal heritage database in the region will assist in addressing cumulative impacts generally. The Department has recommended a condition requiring MCM to engage a suitably qualified person to undertake this survey and recording work in consultation with the Aboriginal community.

[1] This commitment was made in Moolarben's Landscape Management Plan (March 2011) in order to comply with Schedule 3, Condition 42A(c) of the Stage 1 Project Approval (05_0117). The commitment includes enhancing and conserving Property 14 by 2028.

Conclusion
Both the Department and OEH are satisfied that with the implementation of the proposed avoidance, conservation and management measures, the project is unlikely to have a significant impact of the Aboriginal cultural heritage values of the site or region.

Nevertheless, the Department has recommended a condition requiring MCM to implement a detailed Heritage Management Plan for the project and undertaking additional survey and recording works in consultation with the Aboriginal community.

5.9 Socio-economic

Issue
The project would generate a large number of jobs and inject considerable capital investment into Mudgee and the broader Mid-Western Region, which would have a range of benefits but could put pressure on public services and facilities, at least in the short term.

Consideration
The EA includes an economic impact assessment undertaken by Hunter Valley Research Foundation (see Appendix 15 of the EA), which is essentially an input/output based economic analysis.

Benefits
The assessment identified that the project would provide considerable socio-economic benefits, including:

- 220 direct jobs during construction;
- 120 direct jobs during operation;
- $120 million in capital expenditure during construction, which with Stage 1 operations would generate additional regional production and consumption of $260 million;
- average annual revenue during operation of the complex of $780 million,
- $54 million to the state in tax revenues during construction;
- $98 million to the Commonwealth Government in taxes and royalties during operation.

In addition to the direct project-related socio-economic benefits, the assessment indicates that the project would generate an additional 184 indirect jobs during construction of Stage 2 and 1,432 indirect jobs during operation of the complex. Furthermore, the assessment predicts that the project would result in an overall regional flow-on benefit from additional regional production and consumption of $584 million during construction and $731 million per annum during operation of the complex. The total annual benefit to the regional economy is predicted to be $1.5 billion.

Several submissions from special interest groups indicated that the quantum of benefits predicted to flow onto the community as a result of the preferred project were overestimated. The Department accepts that there are limitations to the accuracy of any input/output based economic models, and that any results generated by these models should be treated with caution or subjected to a robust sensitivity analysis. However, in this instance the Department is satisfied that the project would generate substantial economic benefits for both the Stage and region.

Local and Regional Impacts
Numerous submissions, including submissions from Council, raised concerns in relation to local and regional socio-economic impacts associated with the increased number of employees in the area, including:

- housing and rental availability;
- pressure on infrastructure and services, including roads, education, medical and childcare services;
- impacts to local businesses and employers due to increased wages being offered by the mining sector and the loss of local experienced workers to the mining sector.

The Department notes that there are currently five active coal mines in the region (Ulan, Moolarben, Wilpinjong, Charbon and Airly) that are contributing to the current demand on local housing, services and infrastructure. To better understand the current level of housing, infrastructure and service provision, and to inform and influence decision-making about future demands, the Department engaged Manidis Roberts Pty Ltd to undertake a Local Services Assessment for the Mid-Western Regional Area. The assessment was completed in August 2012 and indicates that the overall

population is expected to grow by 10,037 people (from 23,063 to 33,160) by 2030. Of this growth, 5,920 people (ie. 59%) are attributed to mining expansion in the region.

The increased population is predicted to result in:
- a shortage in short and long term accommodation (in the order of 3,896 housing lots);
- a shortage early childcare facilities;
- a shortage in positions at TAFE and university;
- increased pressure on private health care providers;
- a sharp increase in demand for workers, particularly tradespeople; and
- an increased pressure on key infrastructure, including roads (particularly Ulan Road), Mudgee airport and the sewerage system.

The assessment indicates that there is sufficient flexibility within the existing primary and high school facilities to cater for additional enrolments and adequate capacity in the existing and planned upgrades of the hospital system to cater for the predicted increase in population.

The Department acknowledges that the additional pressure on housing, infrastructure and services would occur irrespective of the Stage 2 project, but that the project would contribute to additional pressures and demands in the future.

The Department is satisfied that the majority of the additional demands can be addressed either by the State Government through the normal budgetary process, Council with some funding assistance from MCM (see below), or the private sector. However, the Department is aware that the project would result in a deficit in short-term accommodation and may impact on existing businesses in the region.

Accommodation
MCM has undertaken an analysis of the accommodation requirements of its workforce and determined that the additional employees required during the construction of the Stage 2 operations would result in a deficit of available accommodation. In order to address this issue, MCM has committed to constructing a Temporary Workers Accommodation (TWA) approximately 3.5 kilometres to the north of its Mining Lease 1606. The facility would be able to accommodate up to 300 workers, which would adequately accommodate the Stage 2 construction workforce and, if required, could be used to accommodate some of the complex's workforce for other potential developments. The application to construction the TWA was approved by Council on 22 March 2013.

The Department accepts that as a result of housing shortages in regional areas, mining companies may require alternative means of housing its employees and that the construction of TWA's may be an appropriate means to address these shortages. The Department is satisfied that construction of the Moolarben TWA will help to alleviate any accommodation shortage in the region in the short to medium term, as the housing market adjusts to the growth of mining in the region.

Impacts to Local Businesses
In order to minimise potential impacts to local businesses, such as increased wages being offered to the mining sector and loss of local experienced workers to the mining sector, MCM has committed to a range of measures, such as:
- implementing assistance programs, including sponsorships, apprenticeships and traineeships;
- implementing a hire policy for non-skilled positions to assist in improving the local labour force, which aims to employ up to 50% of its workforce as trainees and apprentices; and
- establish a modern training facility to provide necessary training needs of all employees new to the mining industry.

In addition, MCM has committed to developing a Social Engagement and Issue Response Strategy for the project to facilitate communications between the company and the wider community and business groups, to assist in the identification of areas of concern in the community and jointly develop strategies to manage these concerns.

The Department supports these initiatives and is satisfied that they will minimise potential impacts of the project on local businesses.

Voluntary Planning Agreement

To further assist in managing additional demand on infrastructure and services as a result of the project, MCM has offered to enter into a voluntary planning agreement (VPA) with Council. A draft VPA that included a monetary contribution of $1.365 million was negotiated between MCM and Council in July 2011. However, recent submissions from Council indicate that this amount should be extended to $2.5 million.

The Department has undertaken an analysis of the previous VPAs between Council and the three Mudgee mines. The analysis indicates that Council has recently accepted amounts of between $7,190 and $12,000 per employee (spread over the life of the respective mine) for the Ulan, Wilpinjong and Moolarben Stage 1 operations. If the highest of these amounts was applied to the Moolarben Stage 2 operations, the total VPA would be in the order of $1.464 million (plus annual CPI increases) for employees.

In light of this analysis, MCM revised its offer to Council. The latest offer includes a financial contribution to Council's community infrastructure fund of $12,295 per employee for each permanent employee/contractor at the site in excess of the 320 employees approved under the Stage 1 consent. Based on 122 employees, this offer equates to a contribution of $1.5 million, which would be paid in four annual instalments of $325,000 for the first four years of operation, then instalments of $10,000 annually over the 20 years of the life of the mine. This amount is in addition to the $480,000 offered for Cope Road maintenance contributions discussed above.

The Department believes this amount is reasonable, consistent with recent contributions by both Wilpinjong and Ulan, and adequate to compensate for the demand generated by the project on community infrastructure and services. The Department has recommended a condition formalising the VPA and requiring it to be indexed annually to CPI and payable to Council on 31 March each year.

Conclusion

The Department is satisfied that the project would result in significant social and economic benefits, both in the local and regional economy.

While the project may put some additional pressure on the demand for infrastructure and services within the region, the Department is satisfied that the majority of these demands can be addressed either by the State Government, Council (with monetary assistance from MCM) or the private sector. The TWA is considered appropriate to manage the short-term accommodation deficit.

5.10 Other Issues

The project is likely to generate a range of other environmental impacts – including blasting, visual amenity, lighting and waste impacts and impacts on OEH estate and non-indigenous heritage. However, as indicated in **Table 12**, these impacts are not predicted to be significant, and the Department is satisfied that they can be controlled, mitigated or managed through appropriate conditions of approval.

Table 12: *Other Impacts*

Issue	Consideration	Mitigating Factors
Blasting	• The PPR includes a Blast Impact Assessment (BIM) which was undertaken by Global. • The BIM indicates that the project has the potential to result in blasting impacts to a nearby residence, 3 Aboriginal rock shelters and 5 European heritage items. • The BIM indicates that the Stage 1 operations have shown that blast vibration and overpressure levels can be readily managed to achieve compliance within the relevant criteria. • The BIM indicates that the one privately owned receiver which was predicted to receive blast overpressure impacts above the relevant criteria due to blasting in OC4 has subsequently been purchased by MCM. • MCM has committed to monitor the three rockshelter sites to ensure they are not	• The Department accepts that blasting operations can feasibly be managed to meet the applicable criteria by reducing maximum instantaneous charge and applying other standard blast management techniques. • The Department has recommended strict conditions which require the existing Stage 1 blast conditions (in relation to blast criteria, blasting hours, frequency and operating conditions) to be complied with across the entire complex. • The Department is therefore satisfied that, subject to compliance with these strict blast management conditions, blasting can be managed such that the operations would not significantly affect private property or Aboriginal and European heritage items. • In addition, the Department has recommended a condition requiring a complex-wide Blast

	damaged during blasting operations and to record and manage the European heritage items in accordance with the Heritage Management Plan prior to any disturbance.	Management Plan (BMP) to be prepared and implemented.
Greenhouse Gases	• The PPR includes a Greenhouse Gas (GHG) Emissions Assessment which was undertaken by PAE Holmes. • The assessment predicts that a total of 23.7 million tonnes of carbon dioxide equivalent (($MtCO_2$-e) would be generated over the life of the project. • Numerous specialist interest groups and public submitters raised concerns about the level of GHG's predicted to be generated by the project. • In its response, MCM indicates that this level of emissions is equivalent to 0.07% of the current GHG load and 0.09% of the total emissions for NSW. In addition, MCM indicates that the vast majority of the project-related emissions (ie 99%) are attributed to Scope 3 emissions associated with the indirect use of coal mined at the site. • The assessment concludes that, on a comparative basis, the total GHG emissions from the project represent a very small proportion of the current and global GHG emissions, and when considered in isolation, the project would have a negligible contribution to global warming/climate change. • MCM has committed to a range of measures to reduce GHG emissions from the project, including improving energy use and efficiency.	• The Department notes that, as of 1 July 2011 MCM is now required to offset its Scope 1 emissions through the recently legislated carbon tax as per the provisions of the *Climate Change Authority Act 2011*. • The Department accepts that the GHG emissions predicted to be generated by the project are minor, on a state and international scale. However, the Department has recommended conditions requiring MCM to implement measures to minimise the release of GHG and to prepare and implement a complex-wide Air Quality & Greenhouse Gas Management Plan.
Visual and Lighting	• The EA includes a Visual and Lighting Impact Assessment which was undertaken by O'Hanlon Design Pty Ltd. • The assessment indicates that ridges surrounding the project area form natural barriers shielding direct views of the majority of the surface infrastructure and open cut mine. However, drivers along Ulan and Ulan-Wollar Roads would have temporary views of the surface operations and lighting and sky glow impacts would be experienced by motorists and privately owned residences during various stages of the mining activities. • In its RTS on the EA, Moolaben confirmed that the privately owned properties that were originally assessed as experiencing direct visual impacts associate with the project have subsequently been purchased by the mine. • Several public submitters raised concerns in relation to the loss of aesthetic value of the area and night lighting impacts associated with the mine. • To address these concerns, MCM committed to a range of mitigation and management measures to reduce visual and lighting impacts. These include the use of vegetation screens; progressive rehabilitation of disturbed areas and the use of low brightness floodlights and light shields to minimise stray light. MCM also committed to preparing a Landscape Management Plan which will detail the measures to be undertaken to minimise the visual impact of the project.	• The Department is satisfied with the level of assessment undertaken in relation to visual and lighting impacts. • The Department acknowledges that the project will be situated in an area which is already visually impacted by existing mining operations and believes that this significantly reduces the overall viewer sensitivity to the project. • The Department is satisfied that the mitigation and management measures proposed would reduce impacts to acceptable levels and has recommended conditions to ensure they are implemented.
OEH Estate	• The project has the potential to impact on both the Goulburn River National Park (GRNP) and the Munghorn Gap Nature Reserve (MGNP), which are located approximately 350 m and 50 m respectively from the closest point of OC4. • OEH raised concerns in relation to the impact on the users of the GRNP and more specifically the MGNR, in terms of noise, blasting and dust	• The Department has examined this issue carefully and notes that: – potential impacts on users of the estates would be temporary and are therefore not considered significant; – the potentially affected areas within each estate are negligible in comparison to the vast areas that are available for recreational

	impacts. Concerns were also raised in regards to access, pests and fire management. • To address these issues, the company has made a series of commitments to: - maintain a buffer distance of 50 metres from its mining operations and infrastructure to MGNR; - install a dust deposition monitor adjacent to MGNR to monitor dust fall out and ensure compliance with the predictions made within the EA; - develop exclusion arcs to ensure that no blasts cause significant off-site dust impacts to either GRNP or MGNR (or any other sensitive receiver); - implement management measures to ensure that the project would not lead to inappropriate fire regimes, road kills, introduction of weeds, pathogens or feral animals at either reserve; and - install a fence line along the boundary of the MGNR.	use; - the areas of the estates in the vicinity of the mine are largely inaccessible and contain no structured tourist or recreational facilities; - the nearest formal recreational areas (e.g. picnic areas, camping areas, walking tracks, lookouts etc) within GRNP and MGNR are located 17 kilometres to the east and 5 kilometres to the south of the mine respectively; and - there is no scientific (or other) evidence to suggest that there would be a detrimental impact to humans or animals at the levels of environmental impact predicted in the EA. • For these reasons, the Department is satisfied that the impacts predicted to each estate can be acceptably managed to ensure there is no diminution of amenity on OEH land from the project. • Nonetheless, approval conditions have been recommended to establish noise amenity criteria for both recreational areas and to ensure that the company fully implements its commitments.
European Heritage	• The EA includes a European Heritage Assessment which was undertaken by Heritas Architecture (Heritas). • The assessment indicated that there are no items of National or State Heritage significance or any sites registered with either the NSW Heritage Office or Council within the Stage 2 project area. However, two sites bordering the Stage 2 project area (ie. the GRNP and the MGNR) are listed on the Register of the National Estate (Commonwealth). • Heritas identified an additional 11 European heritage sites within the project area which were considered to be of local significance. These included remnants of an old school site, farm sites, and two houses; a stone wall; a burial site; water troughs; and spring fed wells. Of these, 3 sites would be permanently removed by OC4 operations, 6 sites have the potential to be impacted by blasting and/or subsidence impacts and the remaining 2 sites are located outside of the impact areas and are unlikely to be affected. • MCM has committed to implement a range of specific management measures for the identified heritage items and preparing a Heritage Management Plan in consultation with the Mudgee Historical Society and Council, prior to any disturbance. • As indicated above, MCM has committed to a range of measures to avoid direct impact and manage any indirect impacts on the GRNR and HGNR.	• The Department is satisfied with the level of assessment undertaken in relation to European heritage and the management and archival recording measures proposed. • The Department is satisfied that the project can be managed to avoid direct and manage indirect impacts on GRNP and the MGNR. • The Department has recommended a condition requiring a complex-wide European Heritage Management Plan to be developed in consultation with the Mudgee Historical Society, Council and OEH, to record and manage historic heritage sites across the complex.
Waste	• The EA includes a detailed assessment of the nature and volume of construction and operational waste streams predicted to be generated. • MCM has committed to continuing to implement a hierarchy waste management system, which focuses on avoidance, reduction, reuse and recycling of waste streams.	• The Department has recommended conditions requiring MCM to minimize, monitor and manage waste generated by the project, including coal reject. In addition, the Department has also recommended that MCM be required to monitor and report on effectiveness of the waste minimisation and management measures in the Annual Review.

6. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for both the Moolarben Stage 2 project application (refer to **Appendix I**) and the Moolarben Stage 1 (MOD3) notice of modification (**Appendix J**). These are required to:

- prevent, minimise, and/or offset adverse impacts of the complex;
- ensure standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

The Department believes the conditions reflect current best practice for the regulation of coal mines in NSW.

7. CONCLUSION

The Department has assessed the project application, EA, submissions on the project, MCM's response to submissions and preferred project report, in accordance with the objects of the EP&A Act and the principles of ecologically sustainable development.

This assessment has found that the complex would have a number of adverse environmental impacts, including:

- the clearing of 1,534 hectares (ha) of land, including 123 ha of endangered ecological communities (EECs) and a range of habitat for threatened fauna species;
- potential noise impacts to 5 rural residential properties;
- potential impacts on local and regional groundwater and surface water resources;
- increased traffic on the local road network; and
- direct impact on 148 known Aboriginal sites.

However, the Department is satisfied that these impacts can be adequately mitigated, managed, offset and/or compensated through implementation of a number of commitments made by MCM and conditions recommended by the Department, including:

- a significant offset strategy totally approximately 4,066 ha of native vegetation, including 1,168 ha of EEC, to be conserved and protected in perpetuity, along with a rehabilitation strategy that would ultimately increase this area to 5,568 ha of conservation land;
- regeneration of an additional 1,531 ha of existing cleared and disturbed grasslands within the offset area;
- noise mitigation of moderately affected properties;
- implementation of a water management system to ensure zero discharge of contaminated water from the site;
- establishment of a comprehensive surface water and groundwater monitoring network on the site and surrounds;
- implementation of the Ulan Road Strategy; and
- conservation and in perpetuity protection of 94 Aboriginal heritage sites (including 10 highly significant sites) within 4 conservation areas surrounding the site.

The Department has recommended a broad range of stringent conditions to ensure these measures are effectively implemented. In addition, the Department has recommended conditions requiring MCM to contribute approximately $1.5 million toward community enhancement works.

The Department acknowledges that the project represents a logical extension of the existing mining complex, and that it would make use of existing infrastructure and facilities. The Department also recognises that the project would provide major economic and social benefits for the Mudgee region and to NSW, including:

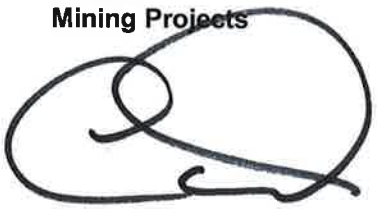
- 220 direct jobs during construction and 120 direct jobs during operation;
- $120 million in capital expenditure during construction, which with Stage 1 operations would generate additional regional production and consumption of $260 million;
- average annual revenue during operation of the complex of $780 million,

- $54 million to the state in tax revenues during construction; and
- $98 million to the Commonwealth Government in taxes and royalties during operation.

On balance, the Department believes that the project's benefits would outweigh its residual impacts that it is in the public interest and should be approved, subject to stringent conditions.

4/2/14

David Kitto
Director
Mining Projects



4.2.14

Chris Wilson
Executive Director
Development Assessment Systems & Approvals

APPENDIX A
ENVIRONMENTAL ASSESSMENT

Refer to the following Department of Planning & Infrastructure website link:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=2371

APPENDIX B
PREFERRED PROJECT REPORT

Refer to the following Department of Planning & Infrastructure website link:

http://majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=2371

APPENDIX C
CONSIDERATION OF ENVIRONMENTAL PLANNING INSTRUMENTS

SEPP (Major Development) 2005

The proposal meets the criteria in clause 7 of schedule 1 of the Major Projects SEPP for classification as a major project (see Section 3.1 of this assessment report). The Department is satisfied that the project can be undertaken in a manner that is generally consistent with the aims, objectives, and provisions of the SEPP.

SEPP (Mining, Petroleum Production and Extractive Industries) 2007

State Environmental Planning Policy (Mining, Petroleum and Extractive Industries) 2007 (Mining SEPP) requires the consent authority to consider number of matters prior to granting development consent:

1. Clause 7 (1) (b) of the Mining SEPP makes mining permissible with consent on any land where development for the purposes of agriculture or industry may be carried out (with or without development consent). Consequently, the proposed development is permissible with consent, and the consent authority may determine the application.
2. Part 3 of the Mining SEPP requires the consent authority to consider the following:
    a. compatibility of the proposal with other land uses;
    b. natural resource management and environmental management;
    c. resource recovery;
    d. road transport; and
    e. rehabilitation.

The Department has fully considered all of these matters in its merit assessment (see Section 5 of this report). Having considered these matters in detail, the Department is generally satisfied that the proposed development can be undertaken in a manner that is generally consistent with the matters for consideration under Part 3 of the Mining SEPP.

SEPP (Infrastructure) 2007

The SEPP requires a consent authority to notify relevant public authorities about developments that may affect public infrastructure or public land. The Department has notified Roads and Maritime Services (RMS) and Mid-Western Regional Council. Neither of these authorities objected to the proposed development, and any recommendations made by these authorities have been considered by the Department, and incorporated into the conditions of consent where appropriate. This satisfies the requirements of *SEPP (Infrastructure) 2007*.

SEPP No.33 – Hazardous and Offensive Development

Yancoal undertook a preliminary hazard analysis (PHA) in accordance with *SEPP No.33 – Hazardous and Offensive Development*. The PHA concluded that the project would not result in offsite hazardous impacts as all hazardous incidents underground (e.g. fires, explosions, etc.) would be confined and the location of open cut workings and site explosive magazines include a sufficient buffer from the site boundary. The Department also considers the project to be consistent with the land use zoning for the surrounding lands.

Consequently, the Department is satisfied that the proposed development does not pose a credible risk under SEPP 33 to surrounding land uses, and is therefore consistent with the aims, objectives, and requirements of SEPP 33.

SEPP No.44 – Koala Habitat Protection

The SEPP requires a consent authority to consider the presence of any core or potential koala habitat. The EIS includes a detailed ecological impact assessment which found that there are no core koala habitat areas. However, there is potential koala habitat within the project area due to the presence of feed tree species. SEPP 44 does not prevent a consent authority granting consent to a development that is located in potential koala habitat.

In this case, the Department notes that the proposed development would not result in any significant impacts on potential koala habitat. As such, the proposed development is not inconsistent with the aims, objectives, and requirements of SEPP 44.

SEPP No.55 – Remediation of Land

The SEPP requires the consent authority to consider whether or not land associated with the project is contaminated. The EIS has identified that there are no known contamination issues affecting the project area. The Department notes that potential contamination may exist as a result of past land use activities. However, SEPP 55 does not prevent a consent authority granting consent to a development on land that may potentially be contaminated. The Department is satisfied that any contaminated land uncovered during the construction or operation stages of the project would be appropriately managed. The Department is therefore satisfied that the project is generally consistent with the aims, objectives, and provisions of SEPP 55.

Mid-Western Regional Interim Local Environmental Plan 2008

Under the *Mid-Western Regional Interim Local Environmental Plan 2008* (the LEP) the Stage 2 surface facilities and open cut mining areas are situated on land defined as Agriculture Zone and Conservation Zone, where mining is permissible with consent.

In addition, the LEP requires the consent authority to consider potential hazards, visual and tree clearing impacts of 'development above the 520 m Australian Height Datum Contour and on environmentally sensitive land'. The Department has considered these matters in its merit assessment (see Section 5 of this report) and is satisfied that the project is generally consistent with the aims, objectives and provisions of the LEP.

APPENDIX D
SUBMISSIONS

(refer to attached CD ROM)