RESPONSE TO SUBMISSIONS REPORT - PART B

Felix Resources Ltd

Moolarben Coal Project – Stage 2

September 2009

CR 6015_7_v2

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1. INTRODUCTION

Moolarben Coal Mines Pty Limited (Moolarben Coal Mines, MCM) is seeking approval for Stage 2 and modification of Stage 1 of the Moolarben Coal Project, under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The Moolarben Coal Project (MCP) is located in the Western Coalfields of New South Wales (NSW), approximately 40 km northeast of Mudgee. The Stage 2 Project (Stage 2) comprises one open cut and two underground coal mines, and supporting facilities. These will be developed adjacent to the Stage 1 Project (Stage 1), which was approved by the NSW Minister for Planning on 6 September 2007. Modification of Stage 1 is required to enable the integration of Stage 2 with Stage 1, and the sharing of employees, equipment, infrastructure and facilities across the integrated mining complex (i.e., the MCP).

An Environmental Assessment (EA) report for Stage 2 and the modification of Stage 1 was publicly exhibited by the Department of Planning (DoP) from 18 March 2009 to 29 April 2009. Members of the public, special interest groups and government agencies with an interest in the project were invited to make a submission on the EA to the DoP. One hundred and seventy-seven submissions were received and forwarded to MCM for consideration.

Since exhibiting the EA, the DoP engaged four independent experts to review the groundwater, surface water, subsidence and rehabilitation aspects of Stage 2. A response to the issues raised by these independent experts is being prepared separate to the response to issues raised in public and agency submissions.

Moolarben Coal Mines, with assistance from Coffey Natural Systems and technical specialists, has prepared a response to the issues raised in the public and agency submissions on the EA. Consideration of issues raised in these submissions concerning air quality, greenhouse gas emissions, blasting, Aboriginal and non-Aboriginal heritage, transport, visual amenity and landscape, social and economic, land use, rehabilitation and mine closure were addressed in the Response to Submissions Report – Part A, which was submitted to the DoP on 21 July 2009.

A response to the remaining issues raised in public and agency submissions concerning noise and vibration, ground and surface water, ecology and biodiversity and subsidence has now been prepared and is provided in this document, Response to Submissions Report – Part B. A summary of the issues raised in public and agency submissions which are addressed in this report, is provided in Table 1.1, following. Moolarben Coal Mines' response to each of these issues is provided in Section 2. Appendix 1 identifies where individual submitters issues have been addressed in this report.

Moolarben Coal Mines' response to the issues raised by the independent experts on groundwater, surface water, subsidence and rehabilitation, and a revised project description, statement of commitments and biodiversity offsets will be provided in a separate report.

Since the EA and Response to Submissions – Part A were prepared, the names and functions of a number of NSW government agencies have changed. The Department of Environment and Climate Change (DECC) is now the Department of Environment, Climate Change and Water (DECCW); the Department of Primary Industries (DPI) is now part of Industry and Investment

NSW; and the water licensing component of the Department of Water and Energy (DWE) is now the NSW Office of Water (NOW). For consistency with the EA, submissions from government agencies and Response to Submissions – Part A, use of previous government agency names (i.e., DECC, DPI and DWE) has been maintained.

This report (Response to Submissions Report – Part B) should be read in conjunction with Response to Submissions Report – Part A and the EA for Stage 2 and the modification of Stage 1.

Table 1.1 Summary of issues raised

Category	Issue	Section
Noise	There is no serious consideration in the EA of the cumulative impacts of noise on residences from mining operations.	2.1.1
	Since noise from Wilpinjong coal mine is audible 15 km from the site, near Wollar, it can be expected that noise from the MCP will also propagate the same distance. Wollar will experience a cumulative noise impact from both the MCP and Wilpinjong coal mine.	
	The DECC indicated that modelled noise levels for the project may be underestimated based on its assessment of the sound power levels specified for mobile equipment and the coal washery.	2.1.2
	The DECC considers that ongoing monitoring of sound power levels is required to ensure that equipment is being operated and maintained in a manner that is consistent with the noise model.	
	The operational noise model did not consider the two water carts as noise sources.	
	There is no consideration of the noise from borefield pumps.	
	There will be increased noise from 76 heavy diesel machines (or 109 when combined with Wilpinjong coal mine) operating 24 hours a day, seven days a week.	2.1.3
	Moolarben Coal Mines should provide the Community Consultative Committee (CCC) with the manufacturer's noise profiling of large machinery, including the bandwidth and sound power levels, particularly of diesel electrics, water carts and overburden drills.	
	Noise from the mine will affect the residents from Moolarben and Cooks Gap through to Gulgong once the hills and natural noise barriers are removed and replaced with a 5 to 15 m bund wall.	2.1.4
	The MCP will add substantially to low frequency and infrasonic emissions in the area.	2.1.5
	The DECC has recommended that the difference between C- and A-weighted levels be evaluated at receiver locations for modelled noise outputs and, where this exceeds 15 dB, a 5 dB penalty is added to the predicted A-weighted level, before comparison with the relevant noise impact assessment criteria.	
	The DECC has identified that the noise impact assessment does not provide the existing level of road traffic noise, for comparison against the criteria in the Environmental Criteria for Road Traffic Noise (ECRTN) guideline.	2.1.6

Noise (cont'd)	There is no specific mention in the EA of potential noise impacts along Ulan Road even though it is expected that 80% of the workforce will reside in Mudgee and, therefore, travel along Ulan Road to the MCP.	2.1.6
	The traffic noise assessment states that traffic from MCP in combination with other sources will increase the overall traffic noise levels on these roads. The noise impact assessment provides no further assessment of cumulative noise impacts resulting from traffic. Xstrata Coal seeks further quantification of the MCP contribution to cumulative road traffic noise including identification of those residences affected by cumulative traffic noise.	
	Mid-Western Regional Council expects that the combined traffic noise of MCP traffic and other sources will mean that residences within 30 m of Ulan-Cassilis Road and Cope Road will exceed night-time criteria. Moolarben Coal Mines should commit to covering the cost of mitigation measures, where possible, and, if necessary, acquire such properties.	
	Monitoring conducted by Advitech in Wollar, March 2009, observed each train emitting in excess of 35 dB(A) for over 15 minutes at a receiver at a distance of 400 m and a maximum of 58 dB(A). This satisfies the Environment Protection Authority (EPA) definition of intrusive noise and is above the sleep disturbance level set by the World Health Organisation (WHO).	2.1.7
	All residents within 500 m of the length of the Gulgong–Sandy Hollow rail line will be affected by rail traffic noise.	
	The DECC indicated that: • The frequency of occurrence of winds of speeds less than 3 m/s for each assessment period in each season has not been presented and no drainage wind component was included with inversion condition modelling, which could lead to an under prediction of noise impacts at residences in the direction of Ulan village and Ridge Road. A 2 m/s drainage flow wind from the southeast is recommended to be included with inversion condition modelling. • The frequency of F class stability class occurrence on winter nights, which includes lapse rates to 4^{o}C/100 m, has not been considered and it is recommended that 4^{o}C/100 m be used in the inversion condition modelling. • The amount of time that mild temperature inversions occur more than 30% of the time is not specified.	2.1.8
	Footnotes to the noise impact assessment criteria (Schedule 3 Condition 2), which state that the noise emission limits identified in Table 2 of the Stage 1 Project Approval apply only up to certain meteorological conditions, are deceptive and the wording becomes a licence to exceed the criteria.	
	The DECC indicated that the noise model did not account for reflected noise from sandstone outcrops and cliffs, or a more reflective ground type cover representative of extended drought conditions.	2.1.9
	The DECC has indicated that to adequately manage the impact of noise on residences, a commitment to implement real-time noise monitoring is required and that this should include on-site monitoring of noise levels during adverse meteorological conditions and the use of noise trigger levels to indicate when operations need to be temporarily altered.	2.1.10

Noise (cont'd)	EA Section 5.3.6.1 suggests that background or control noise monitoring will be established in the Ridge Road to Cooks Gap area to record background noise levels. It is essential that this monitoring be in place before the commencement of the construction of Stage 1 and mining operations in OC1.	2.1.10
	Monitoring of resonating rooms should be included in the noise impact assessment.	
	Internal noise monitoring is not available to affected residents.	
	What does it mean when a property is located within a 'noise management zone'?	2.1.11
	The Industrial Noise Policy (INP) inadequately considers the impacts of noise from mining operations, especially in rural settings.	2.1.12
	The noise impact assessment fails to comply with the INP, particularly relating to ambient noise monitoring, public access to monitoring data, establishment of a complaints-monitoring system, and consideration of loss of property value.	
	Explanation is required for the high ambient noise level of 54 dB for property R36 (Rayner). The property is located in a very quiet part of the valley. Measured ambient noise levels for property R36 (shown in EA Appendix 4 Table S1) are in stark contrast to lower projected noise impact levels on properties closer to noise sources than property R36.	2.1.13
	No baseline noise assessment has been conducted in the area of the Goulburn River Stone Cottages (Property 11) and the northern section of EL6288.	
	Predicted noise contours on maps and figures provided in the EA are incomplete.	2.1.14
	Residents to the north of the MCP have not been given an indication of the expected noise impacts.	
Groundwater	Mining OC2, OC3, and longwalls 9 to 13 of UG4 should be excluded from the MCP as these areas are highly valued by our society for their irreplaceable water resources and other values.	2.2.1
	The proposed borefield is unsustainable, unnecessary and should not be approved.	2.2.2
	The proposal to place an additional borefield adjacent to the Drip on Goulburn River, to provide operational water for Stage 2, is unacceptable and unnecessary poor planning.	
	The production borefield should not be located within 2 km of Goulburn River and the Drip or 'Corner Gorges'.	
	The EA is a flawed document that bases many of its predictions and conclusions on inadequate data and assumptions that include the following:	2.2.3

Groundwater (cont'd)	• Collected baseline groundwater data is assumed to fully represent the hydrogeological environment. • With very little evidence, MCM assumes the Drip is fed only by a perched Triassic aquifer recharged from localised infiltration of rainfall. This is an over-simplification of a complex and dynamic system. • EA Appendix 5 Section 4.7.3 states: 'This [Triassic groundwater] contribution must originate predominantly from the northern side of the river, as the Triassic is largely unsaturated to the south'. This is an extrapolation based on insufficient data. • EA Appendix 5 Section 4.7 states: 'significant impacts to Triassic groundwater levels have only occurred since Ulan Coal Mine increased the width of their longwall panels to 450m'. This is misleading and ignores the fact that Ulan coal mine had collected no solid data on the behaviour of the Triassic aquifers before and during the mining of previous longwalls. 'Ulan Coal Mine monitoring data indicate that the dewatering of the Ulan Seam and the overlying Permian coal measures had negligible impacts on groundwater levels in the Triassic sediments up to the end of 2006.' • The groundwater assessment predicts that the groundwater at point SP49 (Imrie house bore) will experience a 5 m drop in level by 2039, while adjacent Goulburn River and nearby soaks and springs will experience 'no impact' even though 'groundwater derived from the Triassic is believed to be the main baseflow contributor to Goulburn River'. • The collar height of the private bore SP49 is incorrectly shown on all EA tables.	2.2.3
	Mid-Western Regional Council has indicated its concern over the interference to the aquifer system due to dewatering and on-site water use and the adverse impact this will have on existing groundwater users.	2.2.4
	Stage 2 will cause a significant reduction in the quality and quantity of water in bore SP49 and the water supply to Goulburn River.	
	Stage 2 will cause extraction and depressurising of groundwater within Goulburn River Stone Cottages' privately owned coal resource.	
	Impacts on the Triassic aquifer will have far reaching effects on local farmers and communities who rely on groundwater for their livelihood.	
	Groundwater levels will be affected up to 18 km away and a 20 km buffer should be imposed on the development to protect the natural values of the abutting Goulburn River National Park and Munghorn Gap Nature Reserve.	
	As Stage 1 mining has yet to commence, the impacts of subsidence on the aquifer are still unknown.	2.2.5
	The shallow depth of cover in some areas above the Stage 2 underground mines is likely to have a negative effect on overlying aquifers, where present.	
	Subsidence induced groundwater impacts may be masked by dewatering of the open cut mines.	

Groundwater (cont'd)	There should be no mining where there is the potential for damage or deterioration of aquifers.	2.2.5
	The cumulative impact on groundwater, base flows and surface water of the Upper Goulburn River catchment, caused by the interception and interference of Stage 2 when added to the existing and future impacts from Stage 1, Ulan and Wilpinjong mining operations, has not been identified.	2.2.6
	The EA does not appear to accurately consider current operations at the Ulan coal mine, nor appropriately recognise the relative contribution to cumulative impacts of both the MCP and Ulan operations on the Triassic aquifers.	
	The model developed to predict impacts on regional groundwater for Stage 2 is not an accurate indication of cumulative impacts with existing operations. It is calibrated against publicly available mine dewatering records for the Ulan and Wilpinjong coal mines and, therefore, based on a number of assumptions.	
	The EA does not identify the cumulative loss of groundwater from the combined mining operations already approved in the area.	
	The cumulative loss of groundwater through mine dewatering and open cut interception of aquifers and the watertable has not been adequately assessed, quantified or mitigated.	
	The EA does not adequately refer to any independent regional water modelling.	2.2.7
	The modellers have not had access to all relevant information to be able to calculate an accurate regional water model.	
	Information related to the drawdown of the Triassic aquifer systems is very recent and does not measure past losses due to all longwall mining in the Ulan operation.	
	The long-term damage to the water sources of the Upper Goulburn River catchment has not been adequately identified.	2.2.8
	An exhaustive study must be undertaken on the long-term impacts of Stage 2 on water resources prior to the project being approved.	
	The long-term impacts on the watertable from open cut and longwall mining has not been discussed.	
	There seems to be no evaluation of the absorption of rainfall and runoff into large areas of mine rehabilitation. Mine rehabilitation is not as compacted as the original ground surface. The air pockets and spaces between the rock in overburden emplacements will take many years to settle. This increases the absorption of rainfall.	
	There is no indication that water modelling considered the DECC's prediction that rainfall and runoff in the Upper Hunter region will decrease as a result of climate change.	2.2.9

Groundwater (cont'd)	The groundwater model sets the post-mining recovery at 100 years and assumes the climate will not change in this period. This is a high-risk and unacceptable strategy that ignores the long-term effects of an extensively depleted groundwater system on riparian ecosystems combined with lower or infrequent rainfall. The 100-year recovery period equates to the unsustainable mining of irreplaceable water resources in a climatically uncertain future.	2.2.9
	The DWE has recommended that groundwater verification methodology be developed to differentiate between drawdown from longwall mining and drainage to open cut mining.	2.2.10
	The suggested contingency response plans to predicted and 'unforeseen adverse impacts' are disappointing and not supported by adequate baseline data. It is essential that the community has confidence with the monitoring criteria underlying the conditions of consent and protection of the catchment and water resources.	
	Water issues from Stage 1 have still not been satisfactorily addressed. There have been no follow up water studies done on the Swords property ('The Lagoons') since early 2005. It has been four years since the original inspection of groundwater (i.e., dams, springs, wells, etc). The results were questionable.	
	The monitoring of groundwater census points 'on at least a six monthly basis' has not occurred and the baseline data collected does not fully represent the hydrogeological environment.	
	The DWE has indicated that the nominated groundwater impact thresholds (trigger values) specified in the EA (EA Table 5.4.2) are not satisfactory and has recommended that cut off and other impact response triggers be established in consultation with the DWE and DECC.	2.2.11
	The trigger response for groundwater is for groundwater level drawdowns to exceed predicted drawdowns by 20% or more for any consecutive three-month period. Three months is too long a period before a review is carried out and any assessment should be made by an independent hydrologist.	
	Using a 50% increase in salinity for mine water inflows or dewatering discharge as the trigger point is unacceptable. This would push the possible levels for the Triassic groundwater at SW1 to 1,170 μS/cm, which is well over the Australian and New Zealand Environment and Conservation Council (ANZECC) (1992) recommended upland and drinking water levels and allows the pollution of a drinking quality water resource. The Triassic groundwater salinity levels should not be allowed to exceed 800 μS/cm.	
Surface Water and Creek Realignments	There should be no mining where there is a potential for loss in water quality and quantity.	2.3.1
	Water should not be used for mining as it is required, both in adequate quantity and quality, for land owners, agriculture and ecological and riparian systems.	

Surface Water and Creek Realignments (cont'd)	Rivers and waterways should be protected from coal mining.	2.3.1
	Too many rivers are being lost to the coal mining industry; these need to be protected and preserved for future generations to explore and enjoy. Once these areas are destroyed, they can never be rehabilitated to their former glory and are lost forever.	
	The Goulburn River diversion is the regional example of damage caused to waterways interfered with by coal mining activities. The Cumbo Creek diversion on the Wilpinjong coal mine is yet to have a feasible plan developed.	
	There is no genuine analysis of the impact of removing 7.3 ML/day or 2,668 ML/year of water from the regional environment.	
	Enough damage has been done to Goulburn River. The river system will never recover.	2.3.2
	The EA (Appendix 6A) refers incorrectly to Goulburn River and the Drip as a 'substantially altered system… that is no longer representative of the stream conditions that formerly existed'. While the upstream Goulburn River diversion channel (adjacent to the Ulan coal mine) has been significantly modified and degraded by mining, the spectacular downstream section is a highly valued landscape and should be classified accordingly.	
	Goulburn River, including the Drip, Corner Gorge and adjacent escarpment, should be added to Goulburn River National Park to protect these unique features in perpetuity.	
	The average Goulburn River conductivity level at monitoring point SW1 is reported as 780 μS/cm (EA Appendix 6A). This is 20% higher than results reported by the DWE at its Gleniston sampling point (21010017) (average 600 to 700 μS/cm) for the same period. The EA should have acknowledged that the Ulan coal mine discharged saline water prior to 2005 and on a few occasions during 2006, which would have raised electrical conductivity readings.	2.3.3
	The project may cause an increase in the salinity of Goulburn River.	2.3.4
	Mid-Western Regional Council expressed concern over mine dewatering and on-site water use interfering with the river system.	2.3.5
	The project will cause loss of flows to the Goulburn River system.	
	The EA does not consider the overall loss of low flows in the system caused by mining over the lifetime of the MCP.	
	The loss of surface flows to Wilpinjong Creek from Murragamba and Eastern creeks, particularly in low rainfall periods, has not been fully identified, in conjunction with loss of flows from the destroyed creeks systems on the Wilpinjong lease area.	
	The DWE requires that any loss of water to Wilpinjong Creek as a result of mining must be quantified and mitigation strategies developed to account for and replace that loss.	

Surface Water and Creek Realignments (cont'd)	Increased mining in the area will result in the cumulative loss of flows to the Wilpinjong Creek and Upper Goulburn River.	2.3.6
	The cumulative loss of surface flows to the Wilpinjong Creek and Goulburn Rivers systems from Ulan, Stage 1 and Wilpinjong operations has not been adequately assessed, quantified or mitigated.	
	The model for Stage 2 was calibrated using guidelines because of insufficient continuous stream flow data from the area. This means assumptions are being used to assess the impacts of these mining operations on surface flow in the region.	2.3.7
	It is debatable whether the upper Wilpinjong Creek in property 15 is dry, as the area is named after 'running springs'.	
	The DECC has indicated that the EA does not address the level of suspended solids that may be discharged from sedimentation ponds and has recommended that sedimentation ponds be designed to accommodate a 1 in 50 year, 24-hour storm event.	2.3.8
	The EA referred to the possibility of mine discharge into the downstream creek system. This is not an acceptable option for maintaining river health in the Upper Goulburn River catchment.	
	The EA identified that there will be surplus water for the final years of the mine with the completion of open cut mining and maximum inflows into UG4. This would possibly require mine water discharges into natural watercourses.	
	Subsidence and dewatering of UG4 will crack and depressurise the water-rich zone around Goulburn River and permanently alter the structure and connectivity of this water system.	2.3.9
	There is concern over interference to the river system due to mine subsidence.	
	The EA does not address the impacts of the inception and loss of surface water flows caused by subsidence and surface fracturing of drainage lines above UG1 and UG2.	
	The DWE indicated that the combined influence of longwall and open cut mining must be carefully observed and specific management of subsidence impacts must be incorporated into subsidence management plans (or approval conditions) for the proposal.	
	Murragamba Creek is a healthy example of a natural system of chain of ponds. This relatively undisturbed riverine ecosystem demonstrates the hydrological processes of the original watercourses in Australia. This creek should not be disturbed by open cut mining operations.	2.3.10
	The diversion of third order, or greater, creeks or surface waters should not be allowed.	

Surface Water and Creek Realignments (cont'd)	The impact of diverting and realigning Murragamba and Eastern creeks has not been fully described or assessed and there is insufficient detailed information on how creek diversions will be reconstructed over reclaimed mine land.	2.3.10
	Natural watercourses cannot be reconstructed on top of reclaimed mining land.	
	Natural creek beds should not be altered before the construction of any creek bed diversion is at a stage where it is stable and successfully vegetated with locally appropriate species.	
	The ecological integrity of the reconstructed creek bed should be confirmed by independent experts before any mining of the existing creek is allowed.	
	The DWE requires MCM to prepare a detailed management plan outlining how the relocated creeks will be constructed and maintained, including completion criteria and timeframes for construction, revegetation, maintenance and sign off. Detailed design will need to consider measures to establish surface and shallow groundwater connectivity.	
	The DWE requires that each stage of creek reconstruction be certified by a registered engineer and that, prior to excavating the existing creek, each section of reinstated creek is shown to operating successfully.	
	The Hunter-Central Rivers Catchment Management Authority (CMA) does not support the realignment of Murragamba and Eastern creeks. Mining should avoid extraction beneath these waterways.	
	The Hunter-Central Rivers CMA indicated that the EA does not address ongoing maintenance and conservation of Murragamba and Eastern creek catchments once mining is complete.	2.3.11
	Surface water discharges from the MCP to the Goulburn River diversion need to be managed to prevent further degradation of the Goulburn River diversion from sedimentation and erosion.	
	Once the management of a mine changes hands or is put in control of a contractor, there is limited opportunity to monitor rehabilitation activities of disturbed watercourses in line with commitments made in the EA.	
	An adequate water monitoring network must be established so that the source of any impacts on water sources can be clearly identified.	2.3.12
	Current poor remediation of the impacts of the destruction of water sources, such as Bowman's Creek, Glennies Creek, Wambo Creek and the Goulburn River diversion, are an indication that the mining industry has no intention of fixing environmental damage and the NSW government has no resources to regulate or implement these impacts.	2.3.13

Water Demand and Supply	There is insufficient information on the various elements of the site water balance, its analysis, assumptions and mitigation.	2.4.1
Water Demand and Supply (cont'd)	It is unclear if the revised site water balance covers both Stages 1 and 2. If so, the modification to Stage 1 does not include a change from using water for dust suppression to using chemical suppressants across the Stage 1 operations.	2.4.1
	The EA does not consider the economic impacts of reducing the rate of mining or adjusting the mine schedule in response to predicted deficits in water supply.	
	There is no explanation why the mining schedule for Stage 1 has been revised so that maximum groundwater inflows do not occur at the same time as maximum water demand.	
	The DWE requires MCM to comply with the operating rules of any water sharing plan or licence requirements in force under the *Water Act 1912* or *Water Management Act 2000*.	2.4.2
	The DWE requires MCM to assess and report on the MCP water supply as part of a total water balance assessment on a three-yearly basis throughout the life of the mine.	
	Water collection and extraction for mine use should not exceed the permitted harvestable rights for surface water runoff. If inadequate water is available, MCM should adjust their coal production accordingly.	
	Mid-Western Regional Council supports water sharing between the Ulan, Wilpinjong and Moolarben coal mines, and requests that local water supplies be protected.	
	The EA has not identified the cumulative use of water by the Ulan and Wilpinjong coal mines.	2.4.3
	The proposal requires 7.3 ML/day or 2,668 ML/year to run the mining and coal washing operations. This is greater than the combined usage of all households in the local government area (LGA). Mudgee, Gulgong, Rylstone and Kandos all have major water storages to provide the bulk of this water supply. The proposal has only the groundwater and surface water sources associated with Goulburn River from which to obtain this volume of water.	
	The government should commission an independent hydrologist to review the MCM proposal and investigate the cumulative and long-term impacts of the proposal prior to project approval.	2.4.4
	Stage 2 should not be approved until the Regional Water Supply / Monitoring Investigation has been completed and full co-operation of the three mining operators has been reached.	
	The Regional Water Supply / Monitoring Investigation, which is a condition of the Stage 1 Project Approval, is not adequately	

	considered in the Stage 2 EA.	
Water Demand and Supply (cont'd)	The DWE requires that the operating rules of the Water Sharing Plan for the Hunter unregulated and alluvial water sources be incorporated into any mitigation or management measures.	2.4.5
	Options for the management of Splitters Creek Dam must be considered in terms of the limitations and dealings rules permitted under the Water Sharing Plan for the Hunter unregulated and alluvial water sources.	
Ecology	Financial gains of development should not override consideration of the impact on the environment.	2.5.1
	The opening of a new mine does not justify the destruction of ecology, especially the destruction of mature vegetation habitat, which cannot be mitigated.	
	The MCP is likely to compromise the ability of the Hunter-Central Rivers Catchment Management Authority and the NSW government to meet their short-term Catchment Action Plan and State Plan targets, respectively.	
	The Drip and adjacent escarpments should be protected by being included in the Goulburn River National Park.	
	Loss of good condition, intact habitat for threatened species cannot be compensated. Most of the habitats for woodland birds such as Jacky Winter and Restless Flycatcher are highly degraded in NSW, but remnants in the Murragamba Valley are in particularly good condition and should not be destroyed.	2.5.2
	No loss of any endangered ecological community (EEC) and critically endangered ecological community (CEEC) (especially woodland vegetation communities) is acceptable and these communities cannot be offset.	
	Detailed mitigation measures need to be provided, in particular for displaced wildlife. The EA report should have quantitatively demonstrated that the proposed mitigation measures will actually improve or maintain environmental outcomes.	2.5.3
	Mine rehabilitation and regeneration will be over a very long time scale in terms of replacing lost habitat, feeding and nesting grounds for a range of listed threatened species.	
	The environmental management measures and monitoring outlined in EA Tables 6.1 and 6.2 need to be more rigorous and also need to be laid out clearly in the approval conditions.	
	The long-term rehabilitation of subsided land should be included in the mitigation and mine closure plans.	
	Stage 2 should be delayed until Stage 1 is completed so that the proposed revegetation and rehabilitation of the Stage 1 footprint	

	will have time to establish before the Stage 2 clearing of mature, threatened vegetation occurs.	
Ecology (cont'd)	Impacts on the adjacent reserves from groundwater extraction, noise and blasting, lighting, dust, vehicle emissions, and subsidence have not been addressed, in particular, in relation to impacts on flora and fauna (especially nocturnal fauna).	2.5.4
	There are no proposals within the EA report to monitor impacts within the National Estate.	
	The increased territorial pressure on feeding and breeding grounds in the reserves from displaced fauna populations has not been assessed.	2.5.4
	Subsidence is listed as a key threatening process under the *NSW Threatened Species Conservation Act 1995* and should be discussed in the EA report.	2.5.5
	The impacts of subsidence on CEEC, water sources and threatened species has been understated in the EA, particularly in the context of cumulative impacts from Stage 1 and Ulan mines.	
	MWRC is concerned about the removal of two groundwater-dependent ecosystems (GDEs).	2.5.6
	Mining operations are drawing down regional groundwater supplies, which is impacting natural springs and other GDEs.	
	The loss of 11 km of creek habitat in Murragamba Creek and Eastern Creek, including a further 7% of flow in Wilpinjong Creek, will impact on the availability of natural water supply, especially in times of low flow, for fauna species using or travelling between the reserves.	2.5.7
	The construction of any creek bed diversion must be stable and successfully vegetated with locally appropriate species before the natural creek beds are altered in any way. The ecological integrity and geomorphologic and hydraulic stability of reconstructed creek beds should be confirmed by independent experts before any mining of the existing creeks is allowed.	
	The examples of vegetation species suggested for planting the creek beds during the creek realignment process (EA Appendix 6A Table 24) are inappropriate and not native to this upland catchment.	
	Stage 2 will undermine the efforts and investments of many non-government groups and State and Federal governments, which are trying to improve the condition of communities and habitats. Specifically, the Commonwealth government has committed $43.5 million in the Caring for Country Program for the rehabilitation of the CEEC threatened by Stage 2.	
	The Hunter-Central Rivers CMA stated that the EA did not address the loss of in-stream biodiversity during the construction, diversion and eventual alignment of the waterways.	

Ecology (cont'd)	Cumulative impacts from current and approved mining operations and powerlines adjacent to Goulburn River National Park and Munghorn Gap Nature Reserve were not considered or were not adequately considered as part of the EA report, including loss of habitat and disruption of connectivity and green corridors (local scale and Great Eastern Ranges scale).	2.5.8
	The proposal to clear a further 157 ha of CEEC additional to the 69 ha approved for Stage 1, 47 ha approved for Wilpinjong coal mine and 57 ha approved for Wollar-Wellington Transmission Line, has not been quantified in the EA as a cumulative impact on this threatened ecosystem.	
	The loss of high conservation value vegetation and biodiversity has not been adequately offset.	2.5.9
	Offsetting requires increased security and should only proceed if an appropriate legal mechanism or instrument is used to permanently secure the area and enforce the required actions.	
	The management of offset areas is required in terms of threats, time-lag effects, and the uncertainties and risks associated with actions such as revegetation.	
	The Murragamba and Eastern creek valleys should be kept as an offset for the surrounding mines and are better suited to maintain and improve the unique biodiversity values of the healthy woodland communities and CEECs approved for clearance in Stage 1. The offset agreed to for the Stage 1 clearing of 69 ha was an exceptionally poor outcome.	
	The Department of Environment, Water, Heritage and the Arts (DEWHA) stated that the following items need clarification within the ecology assessment of the EA report: • EA Table 5.7.5 does not list all the species that are most likely to be impacted. For example, EA Volume 4 (Appendix 7) Section 9.1.2 states that the Eastern Long-eared Bat has a high likelihood of being impacted by the development, yet this species is not mentioned in the table. • Specific management measures for each *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed species is required as the impact management section of the EA is too vague. • EA Volume 4 (Appendix 7) Section 9.2 needs to clearly state which EPBC Act matters are being affected, including clarification on: – Area and quality of habitat of each species being impacted. – Proportion of regional habitat for this species being impacted. – Regional importance of the habitat (e.g., wildlife corridor).	2.5.10

	• In EA Volume 4 (Appendix 7), information on the Regent Honeyeater on page 121 contradicts information on page 156. Similarly, information on the Spotted-tailed Quoll on page 122 contradicts information on page 158.	
Ecology (cont'd)	Moolarben Coal Mines has not complied with the Project Approval conditions of Stage 1; they have built roads and fences and cleared trees that they said they would not touch.	2.5.11
Subsidence	The DPI has noted that: • Two identified cliff lines (C8 and C9), which are situated on private property, will be the most impacted by subsidence, potentially causing rock falls affecting the general landscape and creating a public safety hazard. • A number of Aboriginal archaeological sites associated with rock formations may be impacted by subsidence. • Depth of cover in the order of 120 m or less may affect groundwater aquifers if they are present above the proposed underground workings.	2.6.1
	Mine subsidence could trigger ground movements that will destabilise the sandstone cliffs and gorges.	2.6.2
	There is no discussion of the condition of the sandstone escarpment in relation to weathering, existing fractures, or density of overhangs.	
	Mine subsidence (in the order of 2.4 m) will seriously damage the only access road to Goulburn River Stone Cottages, its underground telephone line and, with associated mine operations, constitutes a significant risk to guests arriving and leaving throughout the day and night.	2.6.3

2. RESPONSE TO SUBMISSIONS

2.1 Noise

2.1.1 Cumulative Noise Impacts on Residences

Issues

- There is no serious consideration in the EA of the cumulative impacts of noise on residences from mining operations.
- Since noise from Wilpinjong coal mine is audible 15 km from the site, near Wollar, it can be expected that noise from the MCP will also propagate the same distance. Wollar will experience a cumulative noise impact from both the MCP and Wilpinjong coal mine.

Response

The noise impact assessment for Stage 2 considered cumulative mining noise levels (i.e., from Stage 1 and Stage 2 of the MCP, the Ulan coal mine and the Wilpinjong coal mine) on surrounding sensitive receivers, including residences (EA Section 5.3 and EA Appendix 4).

Stage 2 mining operations will be over 11 km west of Wollar at their closest point, the eastern side of OC4. The main mine infrastructure area (comprising coal crushing, washing and rail loading) will be 17 km northwest of Wollar. There are no privately-owned properties to the east of the mine that are predicted to experience noise levels exceeding project-specific noise impact assessment criteria (EA Section 5.3). Noise contours for Year 24, when the eastern side of OC4 will be mined, are presented in EA Volume 2 Plan 28. The 20 dB(A) contour extends into Wilpinjong coal mine but is well short of Wollar. As a comparison, 20 dB(A) is the loudness expected in a broadcasting studio or of rustling leaves. It is extremely unlikely that the MCP will be audible from Wollar under any conditions, particularly given that the Wilpinjong coal mine is much closer to Wollar than the MCP.

The Stage 1 Project Approval establishes the noise impact assessment criteria for all privately-owned properties surrounding the MCP. Moolarben Coal Mines has committed to operating Stage 1 and Stage 2 so that noise emission levels from the MCP comply with the Stage 1 noise impact assessment criteria.

2.1.2 Underestimate of Noise Sources

Issues

- The DECC indicated that modeled noise levels for the project may be underestimated based on its assessment of the sound power levels specified for mobile equipment and the coal washery.
- The DECC considers that ongoing monitoring of sound power levels is required to ensure that equipment is being operated and maintained in a manner that is consistent with the noise model.
- The operational noise model did not consider the two water carts as noise sources.

- There is no consideration of the noise from borefield pumps.

Response

The sound power levels for most of the mobile equipment and the coal washery are based on actual measurements of mining equipment used at other coal mines in NSW. In the case of noise attenuated haul trucks, the sound power level is based on the measured sound power level for a non-attenuated truck minus the estimated noise reduction due to additional attenuation (i.e., grid-box silencers and muffler attenuation) (see Appendix 2 and EA Appendix 4).

The sound power levels used in the noise model for excavators and haul trucks have been specified in the supply contracts for this equipment, and the suppliers must demonstrate that the equipment meets the specified sound power levels. In the case of haul trucks, the supply of non-attenuated trucks will meet the specified sound power level. Nevertheless, MCM has insisted that the haul trucks be fitted with additional noise attenuation.

Ongoing monitoring of mobile equipment sound power levels will be undertaken to ensure that it is operated and maintained in a manner consistent with the noise model.

Significant noise sources were modeled for all mining scenarios and under various meteorological conditions. Mobile noise sources such as trucks, dozers, excavators and drills were modeled at representative operating locations. While water carts were not specifically named in the noise impact assessment, the noise model included sufficient truck movements along haul roads to account for the two water trucks.

Potential noise impacts on residents from operation of the groundwater borefield will be mitigated and managed, where required, through a combination of acoustical shielding around borefield pumps and restricting operation of pumps to daytime hours, where feasible.

2.1.3 Heavy Machinery Noise

Issues

- There will be increased noise from 76 heavy diesel machines (or 109 when combined with Wilpinjong coal mine) operating 24 hours a day, seven days a week.
- Moolarben Coal Mines should provide the Community Consultative Committee (CCC) with the manufacturer's noise profiling of large machinery, including the bandwidth and sound power levels, particularly of diesel electrics, water carts and overburden drills.

Response

Noise is not multiplicative. Two machines generating the same noise level will not generate twice as much noise as that generated from only one machine. Doubling of noise is an increase of 10 dB, whereas the increase in noise from two machines generating the same noise level equates to an increase of 3 dB. Observed noise levels also depends on such factors as the sound power level and frequency content of the noise source, the location and separation distance of the noise source to the observer, the occurrence and location of natural or artificial barriers and meteorological conditions. These and other factors were taken into account in the noise model.

The impact of increasing the amount of heavy machinery required for Stage 2 will potentially give rise to noise levels above the noise impact assessment criteria prescribed in the Stage 1 Project

Approval at nine privately-owned residences. Five of these residences will be impacted by Stage 1 operations and have acquisition rights under the Stage 1 Project Approval. The additional four privately-owned residences will potentially experience noise levels of up to 3 dB above the prescribed noise impact assessment criteria as a result of Stage 2 operations (see Section 3.1.1 and EA Section 5.3).

Monitoring results of heavy machinery sound power levels and operational noise levels will be made available to the CCC.

2.1.4 Environmental Bund

Issues

- Noise from the mine will affect the residents from Moolarben and Cooks Gap through to Gulgong once the hills and natural noise barriers are removed and replaced with a 5 to 15 m bund wall.

Response

The Stage 2 open cut mine (OC4) will be developed within the Murragamba and Eastern creek valleys. These valleys are enclosed to the south and west by the ridgelines of the Munghorn Gap Nature Reserve and adjoining Carrs Gap area. These ridgelines will provide natural screening to the Stage 2 open cut mine and will not be removed by mining. It is standard industry practice to construct acoustic barriers, such as bund walls, to reduce mine operation noise levels where no natural barriers exist. Stage 2 does not require or propose the use of bund walls.

2.1.5 Low Frequency Noise Emissions

Issues

- The MCP will add substantially to low frequency and infrasonic emissions in the area.
- The DECC has recommended that the difference between C- and A-weighted levels be evaluated at receiver locations for modeled noise outputs and, where this exceeds 15 dB, a 5 dB penalty is added to the predicted A-weighted level, before comparison with the relevant noise impact assessment criteria.

Response

Low frequency noise is generally considered to include sound between 20 Hz (the normal limit of human hearing) and 250 Hz. Infrasonic emissions are generally considered to be below 20 Hz.

An analysis of low frequency noise for several representative scenarios at five representative receiver locations (properties: R160, R22, R26, R169 and R170) ranging from 1.4 to over 3 km from the MCP was carried out by Spectrum Acoustics (Appendix 2). An example of the noise model outputs for Year 2, in octave bands is presented in Table 2.1.

Table 2.1 Predicted A- and C-weighted noise levels for Year 2 of the MCP

	Frequency (Hz)								
	Sum	**31.5**	**63**	**125**	**250**	**500**	**1,000**	**2,000**	**4,000**
R160 (Ulan Public School)									
dB(A)	34.0	5.8	15	20.2	28.1	30.7	27.4	12.7	-30.4
dB(C)	45.9	42.2	40.4	36.1	36.7	33.9	27.4	11.3	-32.2
C-A	11.9								
R26 (Robertson – Ulan Road)									
dB(A)	36.6	1.7	13	24.1	27.8	34.1	30.4	14.3	-30.6
dB(C)	45.3	38.1	38.4	40	36.4	37.3	30.4	12.9	-32.4
C-A	8.7								
R169 (Tinker – Cope Road)									
dB(A)	36.6	3	16.8	25.5	29.4	34.1	28.5	9.8	-50.8
dB(C)	47.1	39.4	42.2	41.4	38	37.3	28.5	8.4	-52.6
C-A	10.5								
R22 (Aiten – Ulan Road)									
dB(A)	33.0	-6.2	13.6	22.3	28.5	29.3	23.9	-1.6	-71.7
dB(C)	43.6	30.2	39	38.2	37.1	32.5	23.9	-3	-73.5
C-A	10.6								
R170 (Roberts – Ridge Road)									
dB(A)	33.0	-6.2	13.6	22.3	28.5	29.3	23.9	-1.6	-71.7
dB(C)	43.6	30.2	39	38.2	37.1	32.5	23.9	-3	-73.5
C-A	10.6								

Spectrum Acoustics found that the addition of the 5 dB low-frequency modifying factor is not warranted (see Appendix 2) as the MCP will not add substantially to low frequency noise in the area. Given that this is the case, it is expected that there will not be substantial addition of infrasonic emissions either. Blast overpressure will include frequencies less than 20 Hz, i.e., infrasonic emissions. These are addressed as part of overpressure criteria which are used in the blast assessment in EA Section 5.3 and EA Appendix 4.

2.1.6 Road Traffic Noise

Issues

- The DECC has identified that the noise impact assessment does not provide the existing level of road traffic noise, for comparison against the criteria in the Environmental Criteria for Road Traffic Noise (ECRTN) guideline.
- There is no specific mention in the EA of potential noise impacts along Ulan Road even though it is expected that 80% of the workforce will reside in Mudgee and, therefore, travel along Ulan Road to the MCP.
- The traffic noise assessment states that traffic from MCP in combination with other sources will increase the overall traffic noise levels on these roads. The noise impact assessment provides no further assessment of cumulative noise impacts resulting from traffic. Xstrata

Coal seek further quantification of the MCP contribution to cumulative road traffic noise including identification of those residences affected by cumulative traffic noise.

- Mid-Western Regional Council expects that the combined traffic noise of MCP traffic and other sources will mean that residences within 30 m of Ulan-Cassilis Road and Cope Road will exceed night-time criteria. Moolarben Coal Mines should commit to covering the cost of mitigation measures where possible and, if necessary, acquire such properties.

Response

In 2007, the maximum peak hourly day and night-time traffic noise levels for Ulan Road (i.e., Ulan–Cassilis Road) including Ulan and Wilpinjong coal mine traffic were estimated to be 64 dB(A) $L_{Aeq(1\ hour)}$ at 25 m from the road, 60 dB(A) $L_{Aeq(1\ hour)}$ at 50 m and 56 dB(A) $L_{Aeq(1\ hour)}$ at 100 m (Heggies, 2007). Maximum traffic noise levels on Cope Road (i.e., in Ulan village) prior to the addition of MCP traffic were estimated to be 58.3 dB(A) $L_{Aeq(1\ hour)}$ at 20 m from the centre of the road (Wells Environmental Services, 2006a).

Under these estimated traffic noise conditions, 27 residences within 94 m of the Ulan Road (between the Wollar Road and the Ulan-Wollar Road junctions) were assessed as experiencing traffic noise levels above the night-time road traffic noise criteria of 55 db(A) $L_{Aeq(1\ hour)}$ (EPA, 1999), with four of these residences experiencing traffic noise levels above the daytime road traffic noise criteria of 60 db(A) $L_{Aeq(1\ hour)}$ (Heggies, 2007).

According to the ECTRN, where the traffic noise criteria are already exceeded (as for Ulan Road and Cope Road), traffic arising from a development that increases traffic on a collector road should not lead to an increase in existing noise levels of more than 2 dB.

The Stage 1 noise impact assessment conservatively estimated that Stage 1 traffic at early morning shift change would give rise to a traffic noise level of 52.1 dB $L_{Aeq(1\ hour)}$ at 20 m from the centre of the road (Wells Environmental Services, 2006b), resulting in an increase to existing traffic noise of 0.9 dB(A) at 20 m from the centre of the road through the Ulan village. No increase in traffic noise levels on Ulan road were predicted for Stage 1 traffic.

Stage 2 will require up to 122 employees in additional to Stage 1 staffing levels when the MCP is operating at maximum capacity. An additional 122 vehicles will be added to existing daily traffic volumes on the local road network as a result of Stage 2 if it is conservatively assumed that each of these Stage 2 employees travels to site in their own vehicle. A conservative assessment of traffic noise for Stage 2 can be made for each of these roads if it is further assumed that each of these vehicles travels to and from site on either the Ulan Road or Cope Road within a one hour period at morning and evening shift change.

Using the approach in the noise impact assessment for predicting traffic noise levels (EA Appendix 4 Section 7.2), 122 light vehicles is conservatively estimated to yield a noise level of 54.4 dB(A) $L_{Aeq(1\ hour)}$ at 25 m from the centre of the road (or 55.4 dB(A) $L_{Aeq(1\ hour)}$ at 20 m). Assuming all these vehicles travel on Ulan Road, the addition of 54.4 dB(A) $L_{Aeq(1\ hour)}$ to the 2007 estimated traffic noise level of 64 dB(A) $L_{Aeq(1\ hour)}$ will cause an increase in traffic noise levels on Ulan Road of about 0.5 dB, at 25 m from the road. If, on the other hand, all 122 Stage 2 vehicles travel to and from the site on Cope Road, this additional traffic would increase the estimated noise level on Cope Road by about 1.4 dB, at 20 m from the road. Under both these Stage 2 traffic noise scenarios, the predicted maximum increase to traffic noise levels on Ulan and Cope

roads is within the allowable ECTRN increase of 2 dB, and Stage 2 traffic noise will comply with the required traffic noise criteria.

However, not all Stage 2 traffic will travel solely on Ulan or Cope roads and the estimated Stage 2 traffic noise level increases on these roads will be less than the calculated levels. Moolarben Coal Mines has committed to support the use of bus services to transport workers to and from the MCP, which would further reduce vehicle numbers and traffic noise on the local road network.

As the estimated increase to existing traffic noise levels from Stage 2 traffic is within allowable limits, there is no requirement for MCM to remediate traffic noise at residences along either Ulan or Cope roads as a result of Stage 2.

2.1.7 Rail Traffic Noise

Issues

- Monitoring conducted by Advitech in Wollar, March 2009, observed each train emitting in excess of 35 dB(A) for over 15 minutes at a receiver at a distance of 400 m, and a maximum of 58 dB(A). This satisfies the Environment Protection Authority (EPA) definition of intrusive noise and is above the sleep disturbance level set by the World Health Organisation (WHO).
- All residents within 500 m of the length of the Gulgong–Sandy Hollow rail line will be affected by rail traffic noise.

Response

Once trains leave the approved Stage 1 rail loop and pass onto the Gulgong–Sandy Hollow rail line, they are subject to the conditions of Australian Rail Track Corporation's (ARTC) Environment Protection Licence (EPL) 3142. Currently, EPL 3142 does not contain environmental noise limits. However, it is an objective of the EPL to progressively reduce noise levels to the goals of 65 dB(A) L_{eq}, (day time from 7 am to 10 pm), 60 dB(A) L_{eq}, (night-time from 10 pm to 7 am) and 85 dB(A) (24-hour) maximum pass-by noise, measured at one metre from the facade of affected residential properties. These are the same noise criteria in the DECC's Interim Guidelines for the Assessment of Noise from Rail Infrastructure Projects (DECC, 2007).

The WHO suggests that the equivalent noise level (L_{eq}) inside bedrooms should be limited to 30-35 dB(A) and the maximum noise level (L_{max}) should be limited to 45 dB(A). When considering internal noise levels from an external source, it is normal practice to assume that windows may be partially open, which allows for open windows on warm nights. Based on windows being partially open, the WHO suggests that to achieve it guideline internal levels, the noise levels outside a bedroom window should be limited to 45 to 50 dB(A) L_{eq} and 60 dB(A) L_{max} (Bergland et al., 1999).

The noise impact assessment considered potential cumulative noise impacts from coal trains on the Gulgong–Sandy Hollow rail line against these criteria (EA Appendix 4 Section 6). The total cumulative coal train noise from Ulan and Wilpinjong coal mines and the MCP will be more than 4 dB(A) below the daytime rail traffic noise criteria of 65 dB(A) $L_{Aeq(15\ hour)}$ for residential land uses. However, the night-time rail traffic noise criteria of 60 dB(A) $L_{Aeq(9\ hour)}$ is predicted to be exceeded by 0.4 dB(A) $L_{Aeq(9\ hour)}$. Further investigation may need to be undertaken by ARTC given this predicted 0.4 dB(A) exceedence (EA Section 5.3).

The set back distance for meeting the ARTC's EPL noise criteria is approximately 70 m and is governed by predicted night-time noise levels (i.e., $L_{Aeq(9\ hour)}$). Residences set back greater than 70 m from the Gulgong–Sandy Hollow rail line are therefore not expected to experience exceedences of noise criteria although they will hear passing trains as they do currently.

2.1.8 Meteorological Conditions During Assessment Periods

Issues

- The DECC indicated that:
  - The frequency of occurrence of winds of speeds less than 3 m/s for each assessment period in each season has not been presented and no drainage wind component was included with inversion condition modelling, which could lead to an under prediction of noise impacts at residences in the direction of Ulan village and Ridge Road. A 2 m/s drainage flow wind from the southeast is recommended to be included with inversion condition modelling.
  - The frequency of F class stability class occurrence on winter nights, which includes lapse rates to 4^{o}C/100 m, has not been considered and it is recommended that 4^{o}C/100 m be used in the inversion condition modelling.
  - The amount of time that mild temperature inversions occur more than 30% of the time is not specified.
- Footnotes to the noise impact assessment criteria (Schedule 3 Condition 2), which state that the noise emission limits identified in Table 2 of the Stage 1 Project Approval apply only up to certain meteorological conditions, are deceptive and the wording becomes a licence to exceed the criteria.

Response

The noise impact assessment did not separate day, evening and night-time wind directions, as these winds are not usually present at all times. However, the noise model did assume that winds occur at all times allowing a worst case noise generating scenario to be modelled (see Appendix 2).

The southeast drainage flow identified under F-Class stability conditions (mild inversions) is noise reducing for receivers west of the MCP. Further, receivers in the Ridge Road area west of the MCP are at a higher elevation than the open cut pit noise sources and there are intervening hills so inclusion of a drainage wind under inversion conditions is not required under the DECC's Industrial Noise Policy (INP) (EPA, 2000). However, a 3 m/s gradient wind from the east-northeast was modelled as a worst case scenario, enabling maximum potential noise impacts at receivers to the west of the MCP to be calculated (see Appendix 2).

Re-analysis of stability class data for the winter months (June-August) indicates that F class conditions occur 46.4% of the time during combined evening and night-time periods. The analysis also includes G class conditions, which are estimated to constitute less than 10% of the combined F and G class data. The relative break-up is estimated as 42% occurrence of F class and 4% occurrence of G class conditions during combined evening and night-time periods. Consequently, F class conditions are assessable while G class conditions are not (see Appendix 2).

Under the INP, the upper limit of the range of likely inversion strengths under F class conditions is 4°C/100 m. However, Table E8 of the INP sets the default inversion strength at 3°C/100 m for F class stability conditions (plus a drainage wind up to 2 m/s, if applicable). Hence, an inversion of 3°C/100 m was used in the noise model.

An inversion of 4°C/100 m was modelled for Year-2 MCP conditions to specifically address the DECC's recommendations. A comparison of the modelled noise levels for 3°C/100 m and 4°C/100 m inversion strengths are presented in Table 2.2. The results for a 3 m/s east-northeast wind are included in the table for comparison. The results show a minor (2 dB or less) noise level increase due to the 4°/100 m inversion compared with the 3°C/100 m inversion. However, the predicted noise levels for a 4°/100 m inversion remain below the noise impact assessment criteria (see Appendix 2).

Table 2.2 Predicted operational noise levels for Year 2 of the MCP (dB(A) $L_{eq(15minute)}$)

Receiver	Description	Noise Level, dB(A) $L_{eq(15minute)}$			
		Inversion (3°)	Inversion (4°)	ENE Wind	Criterion
162	Ulan Hotel	36	38	36	65
168	Ulan Anglican Church	35	37	36	45
160A	Ulan Public School	35	36	36	45
151	Ulan Catholic Church	37	38	37	45
25	Tuck-Lee	34	35	36	38
26	Robinson	35	35	37	38
169	Tinker	32	34	35	37
22	Aiton	34	35	35	37
23	Woodhead	33	34	34	37
41A	Libertis	33	34	34	37
63	Whiticker	31	32	32	37
64	Goninan and Boland	31	32	32	37
70	Coventry	30	31	31	37
172	Kimber	30	31	31	37
170	Roberts	25	25	29	37
58	Bevege	30	31	30	35
59	Szymkarcuk	26	27	28	35
61	Miller	25	25	25	35
60	Rayner	25	25	25	35
37	Szymkarczuk	21	23	23	35
40	Devenish	23	24	23	35
41B	Libertis	23	24	23	35
106	Reid	22	23	22	35
171	McGregor	<20	<20	<20	35

Note: results are presented for non mine-owned properties only.

The footnotes to Table 2 (noise impact assessment criteria dB(A)) of Schedule 3 Condition 2 of the Stage 1 Project Approval state that:

- The noise emission limits identified in the above table apply under the meteorological conditions of:
  - wind speeds of up to 3 m/s at 10 metres above ground level; or
  - temperature inversion conditions of up to 3°C/100m, and wind speeds of up to 2 m/s at 10 metres above ground level.

These are consistent with the INP recommendations that are in place because:

- The noise of the wind against the microphone of the noise monitor or the rustling of leaves in nearby trees or bushes can interfere with or mask the noise detected at a monitor from more distant mine noise sources.
- Where F class inversions (3°C/100 m) were found to be a feature of the area (such as in the Hunter Valley), the limit on temperature inversion conditions 'excludes non-standard inversions (which are intense inversions—G class inversions in this case)'.

2.1.9 Noise Reflection

Issues

- The DECC indicated that the noise model did not account for reflected noise from sandstone outcrops and cliffs, or a more reflective ground type cover representative of extended drought conditions.

Response

The addition of reflection from sandstone cliffs and outcrops was considered by Spectrum Acoustics prior to commencement of modelling. However, where cliff lines and rock outcrops occur above the Stage 2 open cut, they are generally small (less than 10 m high), off-vertical and non-continuous, with limited ability to significantly reflect sound back down to ground level or horizontally. While there may be some potential for diffuse reflections, such as scattering from trees and individual rocks, the influence of these reflections on noise emissions from the mine was considered minor. If it could be realistically achieved in the noise model, the addition of these minor reflected noise sources would not increase noise levels over a measurable or audible amount to that predicted in the model (see Appendix 2).

According to Spectrum Acoustics, dry ground is more acoustically absorbent than grass-covered moist ground. Further, the porosity (or flow resistivity) of the ground surface has a greater influence on sound absorption than vegetation cover. Hence, use of the attributed 'grass' cover type in the noise model is more likely to underestimate, rather than overestimate, the amount of sound absorption by the ground. Consequently, predicted noise levels for the MCP include a conservative assessment of ground absorption effects (see Appendix 2).

2.1.10 Noise Monitoring

Issues

- The DECC has indicated that to adequately manage the impact of noise on residences, a commitment to implement real-time noise monitoring is required and that this should include on-site monitoring of noise levels during adverse meteorological conditions and the use of noise trigger levels to indicate when operations need to be temporarily altered.
- The EA Section 5.3.6.1 suggests that background or control noise monitoring will be established in the Ridge Road to Cooks Gap area to record background noise levels. It is essential that this monitoring be in place before the commencement of the construction of Stage 1 and mining operations in OC1.
- Monitoring of resonating rooms should be included in the noise impact assessment.
- Internal noise monitoring is not available to affected residents.

Response

Moolarben Coal Mines will use real-time noise monitors to manage and control noise generated at the MCP (EA Section 5.3). The real-time noise monitors will be strategically located in areas surrounding the MCP, and their location and noise trigger levels will be finalised in consultation with the DECC. Real-time monitoring of mine noise emission levels will enable MCM to temporarily alter mine operations to avoid off-site noise emission levels exceeding the noise criteria for the MCP.

In addition to real-time noise monitors, MCM will use noise loggers and attended noise monitoring at the locations proposed in EA Table 5.3.12 to validate and manage its noise emission levels. The final locations of these monitors will be determined in consultation with the DECC.

The Director-General of Planning has approved a noise management plan including noise monitoring for the construction phase of Stage 1, and this has been implemented by MCM. This includes use of real-time and attended monitoring in locations determined in consultation with the DECC. A continuous noise monitor is operating at property 83 (corner of Ulan Road and Winchester Crescent), which is a representative location for the Ridge Road to Cooks Gap area.

The Stage 1 construction noise management plan will be reviewed and updated prior to commencement of Stage 1 mining and prior to commencement of Stage 2 in consultation with the DECC and to the satisfaction of the Director-General of Planning.

The INP specifies the requirements for establishing noise impact criteria for noise emission levels generated by industrial noise sources, including mines, in NSW. The INP requirements do not include monitoring of resonance within rooms, buildings or structures.

The INP specifies that a value of 10 dB below external noise emission levels is suitable for predicting internal noise levels from external monitoring data. That is, a 10 dB reduction in noise is applied to noise impact assessment criteria for external noise emission levels between the outside and inside of buildings. The INP also specifies how and where noise monitoring is to occur with reference to the building facade. Consequently, the monitoring of noise emission levels external to the building facade is appropriate for determining internal noise levels from external industrial noise sources. Monitoring noise emission levels external to the building facade is also less intrusive and less demanding on people’s privacy.

During construction and operations, residents should contact MCM if they are concerned that mine noise emission levels may be above the noise impact assessment criteria. Potential noise monitoring, including internal noise monitoring where required, will be undertaken where there are legitimate concerns.

2.1.11 Noise Management Zone

Issues

- What does it mean when a property is located within a 'noise management zone'?

Response

The NSW government has developed an approach to regulating mine noise impacts so that the amenity of surrounding private residences is protected. This includes:

- Encouraging companies to establish a buffer between the mine and neighbouring residences, thereby avoiding or reducing the potential for noise impacts on surrounding residents.

- Establishing noise impact assessment criteria for all remaining privately-owned residences and non mine-owned sensitive receiver locations based on monitoring and characterisation of background noise levels, prior to mine development.

- Using a computer model to predict potential noise emission levels at representative locations under different noise generating operational scenarios and meteorological conditions.

- Requiring the mine to implement reasonable and feasible noise mitigation measures at privately-owned properties where noise emission levels are predicted to be greater than the noise impact assessment criteria, at the request of the land owner unless the mining company has some other agreement with the land owner.

- Requiring the mine to acquire privately-owned properties where noise emission levels are predicted to be equal to or greater than 5 dB above the noise impact assessment criteria, at the request of the land owner.

- Requiring the mine to manage its noise generating operations so that noise emission levels do not exceed the impact assessment criteria at all other privately-owned properties.

Moolarben Coal Mines has applied this approach in assessing and managing its noise impacts for the MCP.

Where the noise model predicts that noise emission levels will exceed the noise impact assessment criteria at a privately-owned property, but by less than 5 dB, then that property is said to be in a noise management zone.

2.1.12 NSW Industrial Noise Policy

Issues

- The INP inadequately considers the impacts of noise from mining operations, especially in rural settings.

- The noise impact assessment fails to comply with the INP, particularly relating to ambient noise monitoring, public access to monitoring data, establishment of a complaints-monitoring system, and consideration of loss of property value.

Response

The INP was developed by the NSW EPA to provide a framework for the assessment and monitoring of noise for scheduled activities under the *Protection of the Environment Operations Act 1997* (POEO Act). The INP establishes the process for the setting of noise impact assessment criteria for POEO Act scheduled activities so that the community is protected from excessive intrusive noise and the amenity for specific land uses is preserved. The aim of the policy is to 'allow the need for industrial activity to be balanced with the desire for quiet in the community'.

Mining for coal is a scheduled activity under the POEO Act and the application of the INP is directly relevant to the assessment and determination of noise impact assessment criteria for the MCP. The Stage 2 noise impact assessment was undertaken by Spectrum Acoustics, an acoustic specialist, in accordance with the requirements of the INP.

Stage 2 and the cumulative noise impact of the MCP have been assessed against the noise impact assessment criteria prescribed in the Stage 1 Project Approval. These noise impact assessment criteria were determined against ambient noise measurements made in 2005, prior to any development at the MCP.

Moolarben Coal Mines has established a complaints procedure and has advertised the complaints telephone number (1800 566 484) locally. Moolarben Coal Mines has also established a project website (www.moolarbencoal.com.au), which will be used to provide the community with information about the project, including regularly updated monitoring data.

The INP provides a recommended checklist of factors for a determining authority, in this case the Minister for Planning, to consider when setting statutory noise conditions for a proposed project. The affect of residual noise impacts, above project-specific noise levels, on property values is one of these recommended checklist factors. The INP states: 'Where, in the final analysis, the level of impact would still exceed the project-specific noise levels, the economic and social benefits flowing from the proposed development to the community should be evaluated against the undesirable noise impacts.' It is predicted that privately-owned properties will be impacted during Stage 2 operations, five of which have acquisition rights under Stage 1 (EA Section 5.3.5.2). The Minister will have to evaluate the balance between economic and social benefits and these noise impacts.

2.1.13 Background Noise Levels

Issues

- Explanation is required for the high ambient noise level of 54 dB for property R36 (Rayner). The property is located in a very quiet part of the valley. Measured ambient noise levels for property R36 (shown in EA Appendix 4 Table S1) are in stark contrast to lower projected noise impact levels on properties closer to noise sources than property R36.

- No baseline noise assessment has been conducted in the area of the Goulburn River Stone Cottages (property 11) and the northern section of EL6288.

Response

In the absence of existing noise impact assessment criteria, ambient or background noise levels are used to determine the criteria against which predicted project specific noise levels are assessed. Moolarben Coal Mines has committed to using the noise impact assessment criteria approved for Stage 1 and these are the noise criteria against which the predicted noise levels of the Stage 2 project have been assessed. Hence, the measured ambient noise levels presented in EA Appendix 4 were not used to determine the noise impact assessment criteria.

The noise impact assessment assumes that the 35 dB(A) $L_{Aeq(15\ min)}$ noise impact assessment criterion, determined for Stage 1, applies to residences where background noise levels were not measured (including property 11 – the Goulburn River Stone Cottages). It has also been applied to and property 36 as opposed to modifying the criteria based on noise monitoring results at this property.

The INP states that where the rating background level is found to be less than 30 dB(A), then it is set to 30 dB(A). The default assessment criteria is calculated by adding 5 dB(A) to the rating background level. The default 35 dB(A) criterion therefore assumes that a residence is in the quietest possible setting and background noise monitoring at a given residence can only result in this criterion being adjusted upwards.

2.1.14 Clarification on Noise Assessment

Issues

- Predicted noise contours on maps and figures provided in the EA are incomplete.
- Residents to the north of the MCP have not been given an indication of the expected noise impacts.

Response

The nearest privately-owned residence to the north of the MCP (property 11, Goulburn River Stone Cottages) is located more than 5 km away from the main mine infrastructure area and more than 7 km away from Stage 2 open cut operations. Given the distance from the MCP to this residence, noise modelling was not undertaken to the north of the MCP. The prevailing wind direction in winter and spring is from the southwest (EA Section 5.3). Under these conditions, noise is more likely to propagate to the property 11 from the Ulan coal mine than from the MCP.

The noise impact assessment criteria for privately-owned residences to the north of the MCP is 35 dB(A) $L_{Aeq(15\ min)}$ at all times. Modelled noise contours are presented in EA Volume 2 Plans 23 to 28. The 35 dB(A) $L_{Aeq(15\ min)}$ is not complete to the north of the MCP, however visual extrapolation of this contour shows that it falls well short of property 11, which, therefore, will not experience noise levels above the noise impact assessment criteria.

Moolarben Coal Mines is committed to operate the MCP (Stages 1 and 2 combined) so that noise emission levels comply with the noise impact assessment criteria prescribed in the Stage 1 Project Approval.

2.2 Groundwater

2.2.1 Exclusion of Areas from the MCP

Issues

- Mining OC2, OC3 and longwalls 9 to 13 of UG4 should be excluded from the MCP as these areas are highly valued by our society for their irreplaceable water resources and other values.

Response

The impacts on water resources from mining OC2, OC3 and UG4 (i.e., Stage 1) were assessed in the Stage 1 EA (Wells Environmental Services, 2006b), which has been approved.

Stage 2 will not increase the impacts from Stage 1 OC2, OC3 and UG4 mine areas.

2.2.2 Extraction and Production Borefield

Issues

- The proposed borefield is unsustainable, unnecessary and should not be approved.
- The proposal to place an additional borefield adjacent to the Drip on Goulburn River, to provide operational water for Stage 2, is unacceptable and unnecessary poor planning.
- The production borefield should not be located within 2 km of Goulburn River and the Drip or 'Corner Gorges'.

Response

The groundwater borefield is required to dewater the Ulan Seam ahead of mining in UG4 to provide a safe environment for underground mine workers and to enable extraction of the coal resource. The Ulan Seam is within the Permian-age coal measures, which comprise the most significant aquifers in the MCP area (EA Section 5.4 and EA Appendix 5).

The Permian-age coal measures are below the Triassic-age sandstone units. These Triassic-age sandstone units form the cliff lines along Goulburn River, including the Drip, as well as the bed of the river. It is only the aquifers within the Triassic-age sandstone units that provide baseflow to Goulburn River in the area of the Drip, north of UG4. Groundwater from the Permian-age coal measures does not discharge to Goulburn River in the vicinity of UG4 or the Drip (EA Appendix 5).

The dewatering bores will be developed in the Permian-age coal measures only. That is, bores will be screened against water bearing intervals within the Permian-age coal measures and sealed against the overlying Triassic-age sandstone units. This will prevent groundwater extraction from the Triassic-age sandstone units. Therefore, the development and operation of the borefield will not impact on groundwater baseflow to the river, supply of groundwater to the Drip or supply of groundwater from within Triassic-age sandstone units to surrounding users.

The water bearing intervals within the Permian-age coal measures occur at depths generally greater than 40 m below the base of the overlying Triassic-age sandstone units. That is, well below the base of Goulburn River and the Drip. The aquifers within the Permian-age coal measures are not connected hydraulically to the aquifers within the overlying Triassic-age sandstone. The

potentiometric surface (i.e., groundwater level) of the deeper aquifers within the Permian-age coal measures is at least 20 m below the base of Goulburn River (EA Appendix 5).

Groundwater extracted during the dewatering of the Permian-age Ulan Seam will be used to supplement the mine's operational water supply. Since the approval of Stage 1, MCM has entered into a water sharing agreement with the Ulan coal mine. This water sharing agreement secures the supply of 1,000 ML/year from the Ulan coal mine's surplus water stores. This reduces the requirement for MCM to fully develop the borefield for mine water supply purposes. However, the borefield will still be required to dewater the Ulan Seam to enable safe underground mining. The final surface location of each bore will be positioned to enable the efficient dewatering of the Ulan Seam as mining progresses in UG4. This may require the surface location of individual bores to be located within 500 m of the Goulburn River and the Drip.

2.2.3 Inadequate Data and Model Assumptions

Issue

- The EA is a flawed document that bases many of its predictions and conclusions on inadequate data and assumptions that include the following:
  - Collected baseline groundwater data is assumed to fully represent the hydrogeological environment.
  - With very little evidence, MCM assumes the Drip is fed only by a perched Triassic aquifer recharged from localised infiltration of rainfall. This is an over-simplification of a complex and dynamic system.
  - EA Appendix 5 Section 4.7.3 states: 'This [Triassic groundwater] contribution must originate predominantly from the northern side of the river, as the Triassic is largely unsaturated to the south'. This is an extrapolation based on insufficient data.
  - EA Appendix 5 Section 4.7 states: 'significant impacts to Triassic groundwater levels have only occurred since Ulan Coal Mine increased the width of their longwall panels to 450m'. This is misleading and ignores the fact that the Ulan coal mine had collected no solid data on the behaviour of the Triassic aquifers before and during the mining of previous longwalls.
  - The groundwater assessment predicts that the groundwater at point SP49 (Imrie house bore) will experience a 5 m drop in level by 2039, while adjacent Goulburn River and nearby soaks and springs will experience 'no impact' even though 'groundwater derived from the Triassic is believed to be the main baseflow contributor to Goulburn River'.
  - The collar height of the private bore SP49 is incorrectly shown on all EA tables.

Response

Moolarben Coal Mines has established a comprehensive network of groundwater monitoring bores and has investigated groundwater occurrence in seeps, soaks and springs through a groundwater census of surrounding areas (see EA Section 5.4 and EA Appendix 5). The information collected from this monitoring network and groundwater census, along with publicly available data from Ulan and Wilpinjong coal mines, has been used to develop an understanding of the hydrogeological environment. This understanding informed development of the numerical groundwater flow model.

The impacts of Stage 2 and the cumulative impacts of Stage 1 and Stage 2 on local and regional aquifers have been modelled using an industry accepted and peer reviewed numerical groundwater flow model. The modelling included consideration of likely subsidence effects from underground mining and dewatering from open cut pits and underground mines. The numerical groundwater flow model has been calibrated against publicly available data from the adjacent Ulan open cut and underground coal mine, Wilpinjong open cut coal mine and from the network of monitoring bores established by MCM.

The Stage 1 groundwater impact assessment included a thorough consideration of the potential impacts of longwall mining in UG4 on the overlying Triassic-age sandstone units, Goulburn River and the Drip (Wells Environmental Services, 2006b). The Stage 1 groundwater impact assessment was reviewed by a panel of independent technical experts appointed by the Minister. The independent panel concluded that the integrity of the Drip and its water supply is unlikely to be adversely affected by Stage 1 underground mining (Mackie, 2007).

The Stage 1 Project Approval requires MCM to monitor the effects of longwall mining in UG4 on a panel by panel basis and to use this data to validate and calibrate the numerical groundwater flow model. The updated numerical groundwater flow model will be used to make changes to the groundwater monitoring program and, where required, to management and contingency response measures. Moolarben Coal Mines will offset the loss of baseflow to Goulburn River and associated creeks that may be caused by the Stage 1 mine as required by the Stage 1 Project Approval.

Stage 2 underground mining (UG1 and UG2) will be developed up-dip from the Stage 1 UG4 mine and over 6.5 km from the Drip, on the opposite side of the river. The Triassic-age sandstone units overlying UG1 and UG2 are dry (EA Appendix 5). Therefore, Stage 2 underground mining will not impact on the supply or quality of groundwater from Triassic-age sandstone units at any location surrounding the MCP, including the Drip.

The only change to the predicted impacts from mining on the Triassic-age aquifers between the Stage 2 and Stage 1 groundwater assessments is the additional influence of underground mining at the Ulan coal mine. Since the Stage 1 numerical groundwater flow model was developed, the Ulan coal mine commenced developing wider (400 m) longwall panels in its underground mine. The use of wider longwall panels is predicted to depressurise the aquifers within the Triassic-age sandstone units above the Ulan coal mine (EA Appendix 5). This effect was included in the Stage 2 numerical groundwater flow model.

The net effect of including the wider longwall panels at the Ulan coal mine in the Stage 2 numerical groundwater flow model is reduced groundwater levels within the Triassic-age sandstone units at greater distances from the Ulan underground mine to that previously modelled for Stage 1. This resulted in the predicted 5 m reduction in groundwater levels within bore SP49 at the end of mining in 2039. A 1 to 2 m reduction in groundwater levels was predicted at this bore using the Stage 1 numerical groundwater flow model (Wells Environmental Services, 2006b), prior to use of the wider longwall panels at the Ulan coal mine. Stage 2 mining does not contribute to this increased reduction in groundwater levels within the Triassic-age sandstone units (EA Section 5.4 and EA Appendix 5).

The assumption that wider longwall panels at the Ulan coal mine will cause greater depressurisation and reduction in groundwater levels within Triassic-age aquifers will be validated by monitoring and through data sharing with the Ulan coal mine. Where required, the Stage 2 numerical groundwater flow model will be updated and recalibrated to reflect any changes as a result of monitoring and data sharing.

The collar height of private bore SP49 is not referenced anywhere in the Stage 2 EA.

2.2.4 Impacts on the Aquifer System and Existing Groundwater Users

Issue

- Mid-Western Regional Council has indicated its concern over the interference to the aquifer system due to dewatering and on-site water use and the adverse impact this will have on existing groundwater users.
- Stage 2 will cause a significant reduction in the quality and quantity of water in bore SP49 and the water supply to Goulburn River.
- Stage 2 will cause extraction and depressurising of groundwater within Goulburn River Stone Cottages' privately owned coal resource.
- Impacts on the Triassic aquifer will have far reaching effects on local farmers and communities who rely on groundwater for their livelihood.
- Groundwater levels will be affected up to 18 km away and a 20 km buffer should be imposed on the development to protect the natural values of the abutting Goulburn River National Park and Munghorn Gap Nature Reserve.
- There should be no mining where there is the potential for damage or deterioration of aquifers.

Response

Moolarben Coal Mines has committed to compensate or replace the loss of water (in quality and quantity) to private land owners caused as a consequence of construction or operation of the MCP, including the privately-owned bore SP49 (EA Section 6). As discussed in Section 2.2.3, Stage 2 will not impact on the quality and quantity of water in bore SP49.

Stage 2 will be predominantly developed in the Wollar Creek Sub-catchment of the Hunter-Central Rivers Catchment and will not adversely affect water supply to the Goulburn River (EA Appendix 5 and 6).

Extraction and depressurisation of the coal seam aquifers has been occurring since the 1980s when mining commenced at the Ulan coal mine. Dewatering of the coal resource at the Ulan coal mine occurs within 5 km of, and along strike from, Goulburn River Stone Cottages (property 11). Stage 2 mines are located more than 5 km to the south and up-dip of the Goulburn River Stone Cottages. Dewatering of Stage 2 mines is not expected to adversely affect the availability of water within the Permian-age coal measures beneath Goulburn River Stone Cottages. However, dewatering of the Permian-age coal measures to enable mining of the Ulan Seam in UG4 will reduce groundwater levels by up to 100 m within the Ulan Seam, and by up to about 25 m in the upper Permian-age coal measures beneath Goulburn River Stone Cottages (EA Appendix 5). The Ulan Seam is over 100 m below the surface beneath Goulburn River Stone Cottages and along strike from Stage 1 UG4.

As discussed in Section 2.2.3, the numerical groundwater flow model will be validated against observed monitoring data once mining commences and at periodic intervals during the life of the MCP. This will enable groundwater impact assessment criteria to be reviewed and updated to better reflect site conditions as mining progresses.

The Triassic-age sandstone units overlying the Stage 2 underground mines are dry. Therefore, Stage 2 underground mining will not impact on the supply of groundwater from Triassic-age sandstone units at any location surrounding the MCP.

Groundwater levels in the Ulan Seam (at the base of the Permian-age coal measures) will be reduced by up to 5 m, 18 km from the MCP. Groundwater levels in the lower Permian coal measures will be reduced by up to 5 m, 15 km from the MCP. Groundwater levels in the upper Permian coal measures will be reduced by up to 5 m, 12 km from the MCP (EA Section 5.4 and EA Appendix 5). As discussed in Section 2.2.2, the Permian-age coal measures are located tens of metres below the ground surface. Groundwater within the Permian-age coal measures does not support or sustain the health of vegetation across the Goulburn River National Park or Munghorn Gap Nature Reserve. Hence, the imposition of a 20 km buffer to these reserves is not warranted.

2.2.5 Subsidence Impacts on Aquifers

Issue

- As Stage 1 mining has yet to commence, the impacts of subsidence on the aquifer are still unknown.
- The shallow depth of cover in some areas above the Stage 2 underground mines is likely to have a negative effect on overlying aquifers, where present.
- Subsidence induced groundwater impacts may be masked by dewatering of the open cut mines.

Response

As described in Section 2.2.4, the Triassic-age sandstone units overlying the Stage 2 underground mines (UG1 and UG2) are dry. Further, the Permian-age coal measures, including the Ulan Seam to be mined in Stage 2, are only partially saturated (EA Appendix 5). That is, there are only limited amounts of groundwater stored within the Permian-age coal measures overlying UG1 and UG2. As the rocks overlying the Stage 2 underground mining areas do not comprise significant aquifers, Stage 2 subsidence induced effects on aquifers will be minor.

Moolarben Coal Mines has established monitoring bores and piezometers in the areas above and surrounding UG1 and UG2. These will be used to monitor the effect of mining (open cut and underground) on the partially saturated Permian-age coal measures.

2.2.6 Cumulative Impacts on Groundwater

Issue

- The cumulative impact on groundwater, base flows and surface water of the Upper Goulburn River catchment, caused by the interception and interference of Stage 2 when added to the existing and future impacts from Stage 1, Ulan and Wilpinjong mining operations, has not been identified.
- The EA does not appear to accurately consider current operations at the Ulan coal mine, nor appropriately recognise the relative contribution to cumulative impacts of both the MCP and Ulan operations on the Triassic aquifers.
- The model developed to predict impacts on regional groundwater for Stage 2 is not an accurate indication of cumulative impacts with existing operations. It is calibrated against publicly available

mine dewatering records for the Ulan and Wilpinjong coal mines and, therefore, based on a number of assumptions.

- The EA does not identify the cumulative loss of groundwater from the combined mining operations already approved in the area.
- The cumulative loss of groundwater through mine dewatering and open cut interception of aquifers and the watertable has not been adequately assessed, quantified or mitigated.

Response

The Stage 2 numerical groundwater flow model was used to simulate existing groundwater conditions at each of the existing mines and to predict potential Stage 2 (and Stage 1) mining impacts (EA Section 5.4). The Stage 2 numerical groundwater flow model is an extension of the Stage 1 model. The Stage 2 model was peer reviewed against the Murray Darling Basin Groundwater Flow Modelling Guideline (MDBC, 2001) by Associate Professor Noel Merrick, an independent groundwater expert.

As described in Section 2.2.3, the Stage 2 numerical groundwater flow model was calibrated against publicly available data from the Ulan and Wilpinjong coal mines.

The Stage 2 groundwater impact assessment considered the cumulative impact of all mining activity (present and planned) in the area (EA Appendix 5).

2.2.7 Regional Groundwater Modelling

Issue

- The EA does not adequately refer to any independent regional water modelling.
- The modellers have not had access to all relevant information to be able to calculate an accurate regional water model.
- Information related to the drawdown of the Triassic aquifer systems is very recent and does not measure past losses due to all longwall mining in the Ulan operation.

Response

There was no requirement for MCM to consider independent regional water modelling in its assessment for Stage 2. Notwithstanding, to the best of MCM's knowledge, apart from groundwater models developed to assess mine development impacts, no independent regional water modelling has previously been, or is proposed to be, carried out for the area in which the MCP is located.

As described in Section 2.2.3, the Stage 2 numerical groundwater flow model was calibrated against publicly available data from the Ulan and Wilpinjong coal mines.

Moolarben Coal Mines is currently completing a 'Regional Water Supply / Monitoring Investigation' in fulfilment of its requirements under the Stage 1 Project Approval. As part of this investigation, MCM is required to recommend measures to reduce surface and groundwater impacts of mining in the region. When complete, this report will be submitted to the Director-General of Planning for consideration. Where reasonable and feasible, MCM will adopt and implement the recommended measures to reduce mining impacts on water resources.

2.2.8 Long-term Impacts of Stage 2

Issue

- The long-term damage to the water sources of the Upper Goulburn River catchment has not been adequately identified.
- An exhaustive study must be undertaken on the long-term impacts of Stage 2 on water resources prior to the project being approved.
- The long-term impacts on the watertable from open cut and longwall mining has not been discussed.
- There seems to be no evaluation of the absorption of rainfall and runoff into large areas of mine rehabilitation. Mine rehabilitation is not as compacted as the original ground surface. The air pockets and spaces between the rock in overburden emplacements will take many years to settle. This increases the absorption of rainfall.

Response

The groundwater and surface water assessments undertaken for the EA considered the long-term impacts of Stage 2 on water resources in the Upper Goulburn River catchment (EA Sections 5.4 and 5.5).

Stage 2 is located within the Wollar Creek Catchment. The Wollar Creek Catchment drains an area of about 53,200 ha. The Wollar Creek Catchment is one of twelve subcatchment management zones that comprise the water sources of the Goulburn Extraction Management Unit. The Goulburn Extraction Management Unit is one of three water sharing extraction management units that comprise the Hunter unregulated and alluvial water sharing plan area. The Goulburn Extraction Management Unit drains an area of about 700,000 ha, which has an estimated annual average flow of about 204,000 ML. Of this, only 50,000 ML is licensed for extraction (DWE, 2009a).

The total disturbance area of Stage 2 is less than 2,500 ha, which is less than 5% of the total Wollar Creek Catchment area. The total disturbance footprint of the MCP is less than 4,500 ha. This is less than 0.6% of the whole of the Goulburn Extraction Management Unit water sharing plan area. The estimated annual total water demand for the MCP under full production is about 2,670 ML (EA Section 5.6). This is less than 2% of the annual average flow of the Goulburn Extraction Management Unit and will be met from runoff from disturbed areas, groundwater inflows into pits, surplus water from the Ulan coal mine and from groundwater extraction from the Permian-age coal measures, where required.

On this basis, MCM believes that the MCP will not have a significant long-term impact on the Upper Goulburn River Catchment. Further, that an additional study on the long-term impacts of Stage 2 on water resources is not warranted.

Murragamba Creek and Eastern Creek are low order ephemeral drainage systems and do not comprise well developed, connected alluvial aquifers (EA Appendix 5). Some shallow groundwater (watertable aquifer) resources do occur within alluvial sediments within the Murragamba and Eastern creek valleys, however, both the alluvial sediments and watertable aquifers are poorly developed (EA Section 5.4 and EA Appendix 5). Where these alluvial sediments occur within the Stage 2 footprint, it is either dry or contains saline groundwater (EA Appendix 5).

Backfilling and rehabilitation of the Stage 2 open cut mine void will be carried out on a progressive basis that follows the progress of open cut mining down the Murragamba and Eastern creek valleys. The backfilled pit will be shaped and seeded with a mix of endemic native vegetation species including a mix of grasses, shrubs and trees. However, the backfilling and rehabilitation of the open cut pit will not restore the mined area to pre-mined conditions and there will be a change to the way in which water interacts with the rehabilitated mined area.

Infiltration of rainfall and surface run-off is dependent on numerous factors, including rainfall intensity, surface slope, soil type and structure, extent and type of groundcover, root and extinction depths and rate of evaporation. While established groundcover over rehabilitated areas will act to intercept rainfall, the backfilled pits will generally become large, unconsolidated aquifers. The infiltration of rainfall, once past the root zone, will percolate into the aquifer increasing the pool of stored groundwater within the pore spaces of the backfilled material. This new local groundwater system will reach a level of hydrologic equilibrium. The stored groundwater within the backfilled pit will act to provide a source of recharge to the underlying and down-dip fractured rock aquifers, such as the Permian-age coal measures that extend under Goulburn River National Park from the northern limits of the backfilled pit.

2.2.9 Groundwater Modelling and Climate Change

Issue

- There is no indication that water modelling considered the DECC's prediction that rainfall and runoff in the Upper Hunter region will decrease as a result of climate change.
- The groundwater model sets the post-mining recovery at 100 years and assumes the climate will not change in this period. This is a high-risk and unacceptable strategy that ignores the long-term effects of an extensively depleted groundwater system on riparian ecosystems combined with lower or infrequent rainfall. The 100-year recovery period equates to the unsustainable mining of irreplaceable water resources in a climatically uncertain future.

Response

Climate change models have been used to predict potential changes in annual average rainfall for the Hunter-Central Rivers and Central West catchments. These models predict that annual average rainfall may either increase or decrease by 7% by 2030, and either increase or decrease by 20% by 2070 (CSIRO, 2007a and 2007b). On this basis, the DWE predicts there may be a 5% decrease in mean annual runoff by 2030, relative to 1990 runoff data (DWE, 2008).

A consideration of rainfall runoff under well below average (358 mm/year), below average (519 mm/year), average (645 mm/year) and above average (849 mm/year) rainfall conditions was included in the surface water assessment over the life of the project (EA Section 5.6 and EA Appendix 6A and 6B). These considered that annual rainfall conditions are beyond the 2030 and 2070 climate change scenarios predicted by the CSIRO (2007a and 2007b). However, only average rainfall conditions were included in modelling the recovery of the aquifer systems post-mining. Despite the uncertainties in predicted long-term climate change scenarios, an increase or decrease in annual rainfall will either decrease or increase the amount of recharge available to the groundwater system. This, in turn, will either decrease or increase the post-mining recovery period of the local and regional groundwater system. Groundwater levels will recover above existing conditions once all mining ceases in the area (EA Appendix 5).

Apart from wetlands and River Redgum communities, riparian ecosystems are generally not classified as being groundwater-dependent. The MCP is not predicted to impact on any wetlands or River Redgum communities downstream of the project.

2.2.10 Groundwater Monitoring, Verification and Management

Issue

- The DWE has recommended that groundwater verification methodology be developed to differentiate between drawdown from longwall mining and drainage to open cut mining.
- The suggested contingency response plans to predicted and 'unforeseen adverse impacts' are disappointing and not supported by adequate baseline data. It is essential that the community has confidence with the monitoring criteria underlying the conditions of consent and protection of the catchment and water resources.
- Water issues from Stage 1 have still not been satisfactorily addressed. There have been no follow up water studies done on the Swords property ('The Lagoons') since early 2005. It has been four years since the original inspection of groundwater (i.e., dams, springs, wells, etc). The results were questionable.
- The monitoring of groundwater census points 'on at least a six monthly basis' has not occurred and the baseline data collected does not fully represent the hydrogeological environment.

Response

Since 2005, MCM has continued to develop a network of monitoring bores and multi-level piezometers across the MCP area (EA Section 5.4). As described in Section 2.2.5, this includes monitoring bores and piezometers above and surrounding UG1 and UG2.

Prior to commencing Stage 2 mining, MCM will develop a detailed groundwater monitoring program to verify the predicted impacts on groundwater from Stage 2 open cut and underground mining. This monitoring program will be developed in consultation with the DWE and will be integrated with Stage 1 groundwater monitoring. A groundwater management plan and groundwater response plan will be developed in consultation with DWE for Stage 2. The Stage 2 groundwater monitoring program and management plans will be integrated with the groundwater monitoring program and management plans for Stage 1 and then implemented across the whole of the MCP.

Since 2005, MCM has continued to monitor baseline groundwater conditions in a targeted sample of representative monitoring bores on a monthly basis (EA Section 5.4). While an initial census of groundwater points was carried out, it is impractical and unwarranted to include all of the groundwater census points in the ongoing baseline monitoring program.

Moolarben Coal Mines has committed to undertake a baseline study of all groundwater access points identified in the groundwater census (EA Section 6). The findings of this study will be incorporated with the monthly baseline sampling data to determine likely impact threshold levels for each groundwater census point. Contingency measures in the event of unforeseen groundwater impacts will be developed in consultation with DWE. As discussed in Section 2.2.4, MCM has committed to make good any loss of water (quality or quantity) to surrounding land owners caused by the project.

As mining progresses across the MCP, the existing monitoring network will be supplemented with additional bores and piezometers, which will be specifically located to improve the monitoring of mining induced impacts on local groundwater sources.

2.2.11 Groundwater Impact Thresholds

Issue

- The DWE has indicated that the nominated groundwater impact thresholds (trigger values) specified in the EA (EA Table 5.4.2) are not satisfactory and has recommended that cut off and other impact response triggers be established in consultation with the DWE and DECC.
- The trigger response for groundwater is for groundwater level drawdowns to exceed predicted drawdowns by 20% or more for any consecutive three-month period. Three months is too long a period before a review is carried out and any assessment should be made by an independent hydrologist.
- Using a 50% increase in salinity for mine water inflows or dewatering discharge as the trigger point is unacceptable. This would push the possible levels for the Triassic groundwater at SW1 to 1,170 μS/cm, which is well over the Australian and New Zealand Environment and Conservation Council (ANZECC) (1992) recommended upland and drinking water levels and allows the pollution of a drinking quality water resource. The Triassic groundwater salinity levels should not be allowed to exceed 800 μS/cm.

Response

Prior to the commencement of Stage 2 mining, MCM will update the nominated groundwater impact thresholds for both quantity (groundwater levels) and quality in consultation with the DWE and DECC. This will include finalising suitable groundwater impact thresholds and impact response triggers for mining induced drawdown in surface water connected alluvial aquifers and privately-owned bores and changes in groundwater quality. Groundwater quantity and quality impact thresholds and response triggers will be detailed in the groundwater monitoring, management and response plans for Stage 2.

2.3 Surface Water and Creek Realignments

2.3.1 Protection of Water Sources

Issues

- There should be no mining where there is a potential for loss in water quality and quantity.
- Water should not be used for mining as it is required, both in adequate quantity and quality, for land owners, agriculture and ecological and riparian systems.
- Rivers and waterways should be protected from coal mining.
- Too many rivers are being lost to the coal mining industry; these need to be protected and preserved for future generations to explore and enjoy. Once these areas are destroyed, they can never be rehabilitated to their former glory and are lost forever.
- The Goulburn River diversion is the regional example of damage caused to waterways interfered with by coal mining activities. The Cumbo Creek diversion on the Wilpinjong coal mine is yet to have a feasible plan developed.

- There is no genuine analysis of the impact of removing 7.3 ML/day (2,668 ML/year) of water from the regional environment.

Response

In NSW, the sharing of water between users and land uses (e.g., domestic, cultural, environmental, agricultural, industrial, mining and town water supply) is governed by the *Water Act 1912* (W Act) and the *Water Management Act 2000* (WM Act). These acts and subordinate water policies and guidelines also protect water quality.

As described in Section 2.2.8, Stage 2 is located within the Wollar Creek Catchment. The total disturbance area of Stage 2 is less than 5% of the total Wollar Creek Catchment area. The total disturbance area of the MCP is less than 0.6% of the whole of the Goulburn Extraction Management Unit water sharing plan area. On this basis, MCM believes that the MCP will not have a significant long-term impact on the Upper Goulburn River Catchment.

Stage 2 will permanently alter sections of Murragamba and Eastern creeks. However, these creeks are low order ephemeral drainage features (CMA, 1986), which are currently degraded. Moolarben Coal Mines will reinstate the mined-through creek sections to be geomorphically and hydraulically stable. Once fully rehabilitated, the reinstated drainage lines will provide increased aquatic and riparian habitat and, generally, improve the quality of water draining from the site.

The Goulburn River is a high order, permanently flowing water course and is a major tributary to the Hunter River catchment. The Goulburn River diversion was constructed nearly thirty years ago using approved best engineering practices at that time. Cumbo Creek is a perennial creek (CMA, 1986) of low order. Diversion of Cumbo Creek is part of the approved Wilpinjong coal mine. The Goulburn River diversion and Cumbo Creek diversion are not part of the MCP and are therefore not the responsibility of MCM.

The impact of developing the MCP on surface water and groundwater sources was considered in the groundwater assessment (EA Section 5.4 and EA Appendix 5) and surface water management strategy (EA Section 5.5 and EA Appendix 6A). The estimated annual total water demand for the MCP under full production is about 2,670 ML (EA Section 5.6). This is less than 2% of the annual average flow of the Goulburn Extraction Management Unit and will be met from runoff from disturbed areas, groundwater inflows into pits, surplus water from the Ulan coal mine and from groundwater extraction from the Permian-age coal measures, where required.

Moolarben Coal Mines is committed to protecting water quality, minimising water use and using water as efficiently as possible (EA Section 5.5 and 6). Further, MCM has committed to maintaining environmental flows discharging from Murragamba and Eastern creeks into Wilpinjong Creek.

Stage 2 will not adversely affect the availability or quality of surface water to downstream areas.

2.3.2 Goulburn River and the Drip

Issues

- Enough damage has been done to Goulburn River. The river system will never recover.
- The EA (Appendix 6A) refers incorrectly to Goulburn River and the Drip as a ‘substantially altered system… that is no longer representative of the stream conditions that formerly existed’. While the upstream Goulburn River diversion channel (adjacent to the Ulan coal mine) has been significantly

modified and degraded by mining, the spectacular downstream section is a highly valued landscape and should be classified accordingly.

- Goulburn River, including the Drip and adjacent escarpments, should be added to Goulburn River National Park to protect these unique features in perpetuity.

Response

The impact of Stage 1 on the Goulburn River was assessed in the Stage 1 EA (Wells Environmental Services, 2006b), which has been approved. Stage 2 will be developed in the Wollar Creek catchment and will not impact on the Goulburn River (EA Section 5.5).

The reference in EA Appendix 6A to the Goulburn River as a substantially altered system relates specifically to that section of the Goulburn River that was diverted around the Ulan coal mine. The Drip is at least 4 km downstream from the diverted section of the river. Moolarben Coal Mines acknowledges that the Goulburn River beyond the northern extent of the diverted section has not been substantially altered by mining. Stage 2 will not impact on the Goulburn River riparian corridor, adjacent escarpments or the Drip.

Moolarben Coal Mines generally supports the inclusion of the Goulburn River including the Drip and adjacent escarpments into the Goulburn River National Park. However, MCM believes that these natural features may not be able to be included into the Goulburn River National Park until such time that all coal mining activity has ceased within its exploration area (EL6288).

2.3.3 Discrepancy in Conductivity Measurements

Issue

- The average Goulburn River conductivity level at monitoring point SW1 is reported as 780 μS/cm (EA Appendix 6A). This is 20% higher than results reported by the DWE at its Gleniston sampling point (21010017) (average 600 to 700 μS/cm) for the same period. The EA should have acknowledged that the Ulan coal mine discharged saline water prior to 2005 and on a few occasions during 2006, which would have raised electrical conductivity readings.

Response

The DWE (and its predecessors, such as the Department of Land and Water Conservation (DLWC)) has been monitoring conductivity in the Goulburn River at the Gleniston monitoring site (21010017) since 1993. The Gleniston monitoring site is located in the vicinity of the Gleniston property (i.e., Goulburn River Stone Cottages, property 11) about 3.55 km downstream from the Ulan-Cassilis Road bridge. Elevated conductivity (and therefore salinity) at this site has been attributed to local catchment conditions (sedimentary rocks of marine origin producing saline groundwater), land uses (grazing on poor quality farming land) and to saline discharges from coal mining (DLWC, 2000). From 1993 to 1999, conductivity measurements at the Gleniston river monitoring site ranged from 498 to 2,080 μS/cm, with a median value of 1,265 μS/cm (DLWC, 2000).

The discrepancy in conductivity measurements between MCM's baseline monitoring (site SW1, EA Section 5.5 and EA Appendix 6A) and DWE's regional monitoring (site 21010017) of the Goulburn River is presumed to be due to differences in measuring locations (MCP monitoring site SW1 is 2 km upstream from site 21010017), date and time of monitoring and flow conditions at the time of monitoring. Baseline conductivity measurements at a second MCP monitoring site (SW2) 1.5 km upstream from SW1 (about 3.5 km upstream from site 21010017) for the same baseline monitoring

period as SW1 is reported to be 970 μS/cm (EA Appendix 6A). This is 20% higher than the value recorded at SW1 and 50% higher than the reading at site 21010017. These monitoring observations indicate that conductivity levels generally decrease with distance along the Goulburn River.

2.3.4 Goulburn River Salinity

Issues

- The project may cause an increase in the salinity of Goulburn River.

Response

Conductivity and, therefore, salinity levels in the Goulburn River are the result of natural catchment conditions (saline groundwater), land use practices (grazing) and saline discharges from mining (Ulan coal mine) operations (DLWC, 2000).

Shallow saline groundwater that discharges to surface flows in the Stage 2 area will be removed as a result of mining OC4 (EA Section 5.4). Intercepted and captured saline groundwater will be combined with water supplied from other sources (e.g., surface runoff and surplus water from the Ulan coal mine) and used for on-site dust control and coal washing. The removal of saline groundwater will reduce salinity levels in natural surface waters discharging from the site to downstream areas. This will have a beneficial outcome on surface water quality in downstream areas.

Currently, MCM can only discharge water where it meets the conditions of its environmental protection licence (EPL 12932) for Stage 1. These conditions require that the conductivity of discharge water is below 900 μS/cm (EPA, 2008). The Stage 1 EPL will be revised to include Stage 2. Any requirement to discharge water from Stage 2 will comply with the conductivity limits prescribed in the revised EPL.

2.3.5 Loss of Flows to Watercourses

Issue

- Mid-Western Regional Council expressed concern over mine dewatering and on-site water use interfering with the river system.
- The project will cause loss of flows to the Goulburn River system.
- The EA does not consider the overall loss of low flows in the system caused by mining over the lifetime of the MCP.
- The loss of surface flows to Wilpinjong Creek from Murragamba and Eastern creeks, particularly in low rainfall periods, has not been fully identified, in conjunction with loss of flows from the destroyed creeks systems on the Wilpinjong lease area.
- The DWE requires that any loss of water to Wilpinjong Creek as a result of mining must be quantified and mitigation strategies developed to account for and replace that loss.

Response

The removal of water from a water source (surface water or groundwater) must be accounted for and licensed in accordance with the requirements of the W Act or the WM Act. Within the MCP area, the WM Act prevails over surface water and connected alluvial groundwater sources according to the rules of the Water Sharing Plan for the Hunter unregulated and alluvial water sources, while the

W Act prevails over all other water sources (e.g., fractured rock aquifers and non-connected alluvial aquifers).

Stage 2 will be developed in the Murragamba and Eastern creek catchments. These catchments discharge to Wilpinjong Creek, which discharges to Wollar Creek about 12 km to the east of Stage 2. Wollar Creek discharges to the Goulburn River about 30 km downstream of Stage 2. As described in Section 2.3.1, the Wollar Creek Catchment is one of twelve catchments that comprise the Goulburn Extraction Management Unit of the Water Sharing Plan for the Hunter unregulated and alluvial water sources. The report card for the Wollar Creek water source reports a low flow index of 0.5 ML/day (DWE, 2009b). This is the amount of water discharging into the Goulburn River from the Wollar Creek catchment under low flow conditions. This includes the combined discharge from Wilpinjong Creek, Cumbo Creek, Wollar Creek and their tributaries and connected alluvial aquifers.

Murragamba and Eastern creeks are low order ephemeral drainage systems that flow only in response to recent rainfall, as there is insufficient baseflow to sustain surface flow in these creek lines (EA Appendix 5 and 6A). Hence there are no surface discharges from these creeks into Wilpinjong Creek during periods of low or no rainfall. Murragamba and Eastern creek catchments cover an area of about 3,150 ha. This is less than 6% of the total Wollar Creek Catchment, which covers an area of about 53,200 ha. On a commensurate basis, 6% of the low flow component of the Wollar Creek water source is 0.03 ML/day. Moolarben Coal Mines has committed to maintaining environmental flows discharging from Murragamba and Eastern creeks for the life of the MCP (EA Section 6). This water will be sourced from captured surface runoff upstream of disturbed Stage 2 areas and supplemented with water stored in Splitters Hollow Dam where required (EA Section 5.6). Stage 2 will not cause loss of flows to the Goulburn River system.

Detailed water management and mitigation strategies for Stage 2 will be prepared by MCM in consultation with the DWE.

2.3.6 Cumulative Loss of Flows

Issue

- Increased mining in the area will result in the cumulative loss of flows to the Wilpinjong Creek and the Upper Goulburn River.
- The cumulative loss of surface flows to the Wilpinjong Creek and Goulburn River systems from Ulan, Stage 1 and Wilpinjong operations has not been adequately assessed, quantified or mitigated.

Response

Moolarben Coal Mines will manage its water use at the MCP as efficiently as practicable. This includes obtaining all necessary water licences and abiding by the conditions of those licences. This will include reducing the amount of groundwater extracted by the borefield through water sharing with adjacent coal mines.

Since the EA was exhibited, MCM has entered into a water sharing agreement with the Ulan coal mine. As discussed in Section 2.3.5, Stage 2 will not result in reduced environmental flows in Wilpinjong Creek or the Goulburn River and, therefore, will not contribute to any cumulative mining impacts to these water sources.

2.3.7 Insufficient Data for Assessing Impacts on Regional Surface Flow

Issues

- The model for Stage 2 was calibrated using guidelines because of insufficient continuous stream flow data from the area. This means assumptions are being used to assess the impacts of these mining operations on surface flow in the region.
- It is debatable whether the upper Wilpinjong Creek in property 15 is dry, as the area is named after 'running springs'.

Response

Continuous stream flow data is not available for the Murragamba and Eastern creek catchments. Murragamba and Eastern creeks are ephemeral drainage systems and only flow in response to recent rainfall events (EA Appendix 5 and 6A). Hence, stream flows for these two drainage systems were determined using standard industry guidelines. This enabled a determination of environmental flows for these two creeks to be made. No assumptions on regional surface flows were required.

The assessment of surface flows in upper Wilpinjong Creek is based on field observations.

2.3.8 Discharges to Surface Waters

Issue

- The DECC has indicated that the EA does not address the level of suspended solids that may be discharged from sedimentation ponds and has recommended that sedimentation ponds be designed to accommodate a 1 in 50 year, 24-hour storm event.
- The EA referred to the possibility of mine discharge into the downstream creek system. This is not an acceptable option for maintaining river health in the Upper Goulburn River catchment.
- The EA identified that there will be surplus water for the final years of the mine with the completion of open cut mining and maximum inflows into UG4. This would possibly require mine water discharges into natural watercourses.

Response

All runoff from disturbed areas will be contained on-site (EA Section 5.5). Sedimentation ponds and catchment swales will be sized to contain storm flows up to at least the 20 year recurrence event (EA Appendix 6A). Sedimentation ponds will be appropriately sized to allow for sediment build-up and to provide adequate free board, based on the catchment area and gradient, in accordance with Blue Book guideline criteria (Landcom, 2004). This will ensure adequate residence time for sediments to settle out of sediment laden storm waters. Moolarben Coal Mines will prepare a detailed sediment and erosion control plan for Stage 2 in consultation with the DECC and DWE prior to Stage 2 construction works.

As discussed in Section 2.3.4, the EPL for Stage 1 will be revised to include Stage 2. Any requirement to discharge water from Stage 2 will comply with the water quality limits prescribed in the EPL. Discharge requirements for groundwater from the Stage 1 underground mine (UG4) was assessed in the Stage 1 EA (Wells Environmental Services, 2006b), which has been approved.

2.3.9 Subsidence Impacts on Surface Waters

Issue

- Subsidence and dewatering of UG4 will crack and depressurise the water-rich zone around Goulburn River and permanently alter the structure and connectivity of this water system.
- There is concern over interference to the river system due to mine subsidence.
- The EA does not address the impacts of the inception and loss of surface water flows caused by subsidence and surface fracturing of drainage lines above UG1 and UG2.
- The DWE indicated that the combined influence of longwall and open cut mining must be carefully observed and specific management of subsidence impacts must be incorporated into subsidence management plans (or approval conditions) for the proposal.

Response

The impact of subsidence and dewatering of UG4 was assessed in the Stage 1 EA (Wells Environmental Services, 2006b), which has been approved.

Moolarben Creek, Murragamba Creek, Bora Creek and Wilpinjong Creek are all located beyond the limits of predicted UG1 and UG2 surface subsidence effects and will not be impacted by Stage 2 underground mining (EA Appendix 8). The Goulburn River is at least 1.5 km from the predicted limit of surface subsidence for UG1 and UG2. At this distance, UG1 and UG2 will not impact on the Goulburn River.

Cracking of bedrock in drainage lines overlying UG1 and UG2 and some inception of surface water flow is expected (EA Section 5.5 and 5.8 and EA Appendix 8). However, all drainage lines within the area of Stage 2 surface subsidence function only to channel runoff from the steeper ridgelines to the adjoining valleys during rainfall events. The drainage lines are first order channels and any inception of surface flow resulting from bedrock cracking will be minor (EA Section 5.5 and 5.8). Mining of UG1 and UG2 will occur on a progressive basis over 13 years (EA Section 4 and EA Plan 11). During this time, impacts on the overlying drainage lines and inflow of water into underground areas will be monitored. Where significant loss of flow occurs, then bedrock cracks in drainage lines will be remediated (EA Section 5.8).

Prior to mining in UG1 and UG2, MCM will prepare a detailed subsidence management plan in consultation with government agencies (EA Section 5.8). This will include detailed monitoring of subsidence effects on overlying and surrounding water sources, detailed measures to mitigate and remediate the effects of subsidence on overlying drainage lines, and progressive validation of predicted subsidence impacts.

2.3.10 Creek Diversions

Issue

- Murragamba Creek is a healthy example of a natural system of a chain of ponds. This relatively undisturbed riverine ecosystem demonstrates the hydrological processes of the original watercourses in Australia. This creek should not be disturbed by open cut mining operations.
- The diversion of third order, or greater, creeks or surface waters should not be allowed.

- The impact of diverting and realigning Murragamba and Eastern creeks has not been fully described or assessed and there is insufficient detailed information on how creek diversions will be reconstructed over reclaimed mine land.
- Natural watercourses cannot be reconstructed on top of reclaimed mining land.
- Natural creek beds should not be altered before the construction of any creek bed diversion is at a stage where it is stable and successfully vegetated with locally appropriate species.
- The ecological integrity of the reconstructed creek bed should be confirmed by independent experts before any mining of the existing creek is allowed.
- The DWE requires MCM to prepare a detailed management plan outlining how the relocated creeks will be constructed and maintained, including completion criteria and timeframes for construction, revegetation, maintenance and sign off. Detailed design will need to consider measures to establish surface and shallow groundwater connectivity.
- The DWE requires that each stage of creek reconstruction be certified by a registered engineer and that, prior to excavating the existing creek, each section of reinstated creek is shown to operating successfully.
- The Hunter-Central Rivers CMA does not support the realignment of Murragamba and Eastern creeks. Mining should avoid extraction beneath these waterways.

Response

As described in Section 2.3.1, Murragamba and Eastern creeks are low order (first and second order) ephemeral drainage systems, which presently exhibit large extents of bed and bank degradation, the result of past clearing and grazing activities (EA Section 5.5 and 5.17 and EA Appendix 6A). This is recognised in the Hunter Catchment Blueprint (DLWC, 2003), which attributes high sediment and salinity loads in these surface water sources to current land practices (i.e., clearing and grazing).

Stage 2 does not include the diversion of any third order or greater water course.

Moolarben Coal Mines has presented a conceptual design for reinstating mined through sections of Murragamba and Eastern creeks (EA Section 5.5 and EA Appendix 6A). This includes consideration of channel morphology, bed and bank materials, meander design, pool and riffle features, flow gradient, rehabilitation species and general location of realigned creek channels. Prior to mining in OC4, MCM will prepare a detailed management plan for reinstating the creeks on a progressive basis. This will include detailed engineering design; material specifications; construction, rehabilitation and maintenance schedules; and completion and sign-off criteria. The detailed management plan will be prepared by a qualified hydraulic engineer in consultation with DWE and DPI and will include regular review (at least every three years) to ensure that the plan incorporates current industry best practice and lessons learnt on-site.

Moolarben Coal Mines acknowledges concern over the reinstatement of drainage channels on reclaimed mine land. However, this will be a focus of the detailed management plan for reinstating the creek systems. Moolarben Coal Mines expects it will be required to pay a security bond against site rehabilitation, including the reinstated creeks. To recover this security bond, MCM will need to demonstrate that the reinstated and rehabilitated creeks are geomorphologically and hydrologically stable and that ecosystem function (riparian and aquatic) is established to a self sustaining level.

As indicated, Moolarben Coal Mines will work with the DWE and DPI to ensure that the detailed creek design and its implementation meet the expectations of government. Moolarben Coal Mines will ensure that the realigned creeks will improve off-site water quality and aquatic and riparian habitat. The outcome of these actions will meet the water quality and biodiversity catchment action targets (HCRCMA, 2007) in the long-term.

2.3.11 Management and Maintenance of Surface Watercourses

Issues

- The Hunter-Central Rivers CMA indicated that the EA does not address ongoing maintenance and conservation of Murragamba and Eastern creek catchments once mining is complete.
- Surface water discharges from the MCP to the Goulburn River diversion need to be managed to prevent further degradation of the Goulburn River diversion from sedimentation and erosion.
- Once the management of a mine changes hands or is put in control of a contractor, there is limited opportunity to monitor rehabilitation activities of disturbed watercourses in line with commitments made in the EA.

Response

As discussed in Section 2.3.10, MCM will prepare a detailed management plan for the realignment of Murragamba and Eastern creeks. This plan will include monitoring and maintenance measures for the reinstated creeks for the life of the mine and completion criteria which will need to be demonstrated prior to MCM relinquishing its responsibility for ongoing maintenance of the creeks.

The EPL for Stage 1 prescribes the quality, quantity and rate of discharge under which MCM is allowed to discharge water from Stage 1 into Bora Creek. This ensures that licensed discharges will not further degrade the Goulburn River diversion channel. Moolarben Coal Mines has established a surface water monitoring site on Bora Creek where it discharges into the Goulburn River diversion channel. This will enable MCM to monitor the quality of natural surface flows and water discharged from Stage 1 in Bora Creek to be monitored. The EPL for Stage 1 will be revised to include Stage 2. However, licensed discharges from Stage 2 are likely to be directed into Wilpinjong Creek, although this will be a matter for the DECC to decide.

The conditions of development approval apply for the duration of the approval and rest with the land on which that development is carried out. Provided that commitments made in an EA are included as part of development approval, then a transfer in ownership or operation of the development also transfers the responsibility of meeting those commitments made in the EA to the new owner.

2.3.12 Water Monitoring Network

Issues

- An adequate water monitoring network must be established so that the source of any impacts on water sources can be clearly identified.

Response

Prior to commencement of Stage 2 mining, MCM will develop a detailed surface water monitoring program for Stage 2 in consultation with DWE (EA Section 5.5). This will be integrated with the Stage 1 surface water monitoring program.

2.3.13 Mining Industry and Government Intentions

Issues

- Current poor remediation of the impacts of the destruction of water sources, such as Bowman's Creek, Glennies Creek, Wambo Creek and the Goulburn River diversion, are an indication that the mining industry has no intention of fixing environmental damage and the NSW government has no resources to regulate or implement these impacts.

Response

Moolarben Coal Mines cannot comment on impacts on water sources caused by other mines. However, it is committed to realign and reconstruct the mined sections of Murragamba and Eastern creeks to be geomorphologically, hydraulically and ecologically sound (EA Section 6). This will be done using best practice engineering and rehabilitation practices, including monitoring and adaptive management.

2.4 Water Demand and Supply

2.4.1 Water Balance

Issue

- There is insufficient information on the various elements of the site water balance, its analysis, assumptions and mitigation.
- It is unclear if the revised site water balance covers both Stages 1 and 2. If so, the modification to Stage 1 does not include a change from using water for dust suppression to using chemical suppressants across the Stage 1 operations.
- The EA does not consider the economic impacts of reducing the rate of mining or adjusting the mine schedule in response to predicted deficits in water supply.
- There is no explanation why the mining schedule for Stage 1 has been revised so that maximum groundwater inflows do not occur at the same time as maximum water demand.

Response

The site water balance and the assumptions made in determining the water balance are described in the surface water management strategy (EA Appendix 6A). The water balance considered the predicted water demand for the whole of the MCP (combined Stages 1 and 2) and for Stage 2 separately. The water balance was based on the indicative mine schedule (EA Section 4 and EA Appendix 6A) and all water sources available to MCM at the time the water balance was prepared (i.e., pit inflows, rainfall runoff capture from disturbed areas, dewatering of underground mines and pumping of groundwater for mine use from coal measures aquifers). It also included modelling of well below average (358 mm/year), below average (519 mm/year), average (645 mm/year) and above average (849 mm/year) rainfall conditions (Section 2.2.9 and EA Section 5.6 and EA Appendix 6A).

Following the preparation of the initial water balance (EA Appendix 6A), MCM reviewed its water demand requirements and determined that it would need less water than was originally proposed (EA Section 5.6 and EA Appendix 6B). A revised water balance was calculated for the updated water demand for both the MCP and Stage 2 only water balance analysis scenarios (EA Appendix 6B).

Since the Stage 2 EA was exhibited, MCM has entered into an agreement with the Ulan coal mine to secure access to at least 1,000 ML/yr of surplus water from the Ulan coal mine for the duration of the MCP. The addition of this water source satisfies all predicted water deficit water balance scenarios for the duration of mining at the MCP. Further, it will reduce the requirement to pump water from the groundwater borefield for operational water uses. Hence, MCM does not expect that it will need to reduce production rates or adjust its mine schedule in response to inadequate water availability. Consequently, an assessment of the economic impact of reducing production rates or adjusting the mine schedule in response to insufficient water supplies is not warranted.

Moolarben Coal Mines has updated the water balance for the MCP to include the water that is now available from the Ulan coal mine. An updated detailed water balance will be included in the revised project description for Stage 2, which will be provided to the DoP in a separate report.

Moolarben Coal Mines will implement best practice environmental management to avoid off-site impacts as a result of construction and operations activities at the MCP. This will include enhanced dust suppression on trafficked areas (e.g., use of chemical dust suppressants). This will reduce dust levels and water use (EA Section 5.1 and 5.6), both of which are positive environmental outcomes. Moolarben Coal Mines believes that using best practice environmental management for dust control is not a matter that requires consideration through a modification to Stage 1.

Moolarben Coal Mines has adjusted its indicative mining sequence for Stage 1 based on a rationalisation of mining open cut and underground coal resources in both Stage 1 and Stage 2. The proposed mining sequence is indicative only. In preparing this mining sequence, MCM has considered timing and cost of development, fleet and staff projections, long-term market forecasts, future resource and mine development opportunities, and environmental factors. Alignment of predicted maximum water demand with maximum underground mine inflow does not occur in the updated mining sequence.

2.4.2 Water Supply

Issues

- The DWE requires MCM to comply with the operating rules of any water sharing plan or licence requirements in force under the *Water Act 1912* or *Water Management Act 2000*.
- The DWE requires MCM to assess and report on the MCP water supply as part of a total water balance assessment on a three-yearly basis throughout the life of the mine.
- Water collection and extraction for mine use should not exceed the permitted harvestable rights for surface water runoff. If inadequate water is available, MCM should adjust their coal production accordingly.
- Mid-Western Regional Council supports water sharing between the Ulan, Wilpinjong and Moolarben coal mines and requests that local water supplies be protected.

Response

Moolarben Coal Mines will abide by the operating rules of the Water Sharing Plan for the Hunter unregulated and alluvial water sources and will comply with the conditions of any water licence issued by the DWE for the MCP.

Moolarben Coal Mines will report on its water use annually in its Annual Environmental Management Report for the MCP. It will also separately report on bore yields and pit inflows to the DWE where this is prescribed in the conditions of any of its water licences.

Water collection and extraction for mine use will comprise pit inflows (surface water and groundwater), runoff water captured from disturbed areas, surplus water from the Ulan coal mine water and water pumped from dewatering and production bores (EA Section 5.6). Surface water runoff on disturbed areas will be managed (including capture and use) as an environmental protection measure to avoid polluting off-site water sources. Clean water runoff from undisturbed areas will be diverted around the mining operation and will not be captured or used (i.e., harvested) for operational purposes.

The site water balance is based on the mine schedule proposed in the EA (EA Section 4) and on the availability of water from all proposed sources. This assumes full production is reached in year 2 of mining and is maintained for the duration of the project. In reality, coal production and, hence, water demand will be influenced by market demand and other mining constraints. As discussed in Section 2.4.1 MCM will access at least 1,000 ML/yr of surplus water from the Ulan coal mine. The MCP will have adequate supply of water throughout its entire life without the need to harvest clean water runoff from undisturbed areas.

Moolarben Coal Mines has committed to compensate or replace water lost to private land owners as a consequence of the construction or operation of the MCP (EA Section 6).

2.4.3 Cumulative Use of Water

Issues

- The EA has not identified the cumulative use of water by the Ulan and Wilpinjong coal mines.
- The proposal requires 7.3 ML/day or 2,668 ML/year to run the mining and coal washing operations. This is greater than the combined usage of all households in the local government area (LGA). Mudgee, Gulgong, Rylstone and Kandos all have major water storages to provide the bulk of this water supply. The proposal has only the groundwater and surface water sources associated with Goulburn River from which to obtain this volume of water.

Response

The cumulative use of water by the Ulan and Wilpinjong coal mines and MCM was considered in both the groundwater and surface water assessments (EA Appendix 5 and 6A). The use or licensing of water at other mine sites forms part of the licensing at each of these mine sites.

As discussed in Section 2.4.1, the combination of all available water supplies (i.e., pit inflows, rainfall runoff capture from disturbed areas, water sharing and the pumping of groundwater from coal measures aquifers) is sufficient to meet MCM's water demands for the duration of the MCP. No water will be sourced from the Goulburn River or its connected alluvial groundwater.

2.4.4 Regional Water Assessment and Monitoring Investigation

Issue

- The government should commission an independent hydrologist to review the MCM proposal and investigate the cumulative and long-term impacts of the proposal prior to project approval.

- Stage 2 should not be approved until the Regional Water Supply / Monitoring Investigation has been completed and full co-operation of the three mining operators has been reached.
- The Regional Water Supply / Monitoring Investigation, which is a condition of the Stage 1 Project Approval, is not adequately considered in the Stage 2 EA.

Response

The DoP has engaged an independent water specialist (Gilbert and Associates) to review the Stage 2 surface water assessment. Moolarben Coal Mines' response to this independent review will be provided to the DoP in a separate report.

Of the three mines in the region (i.e., Ulan and Wilpinjong coal mines and the MCP), MCM is the only one that has a legal requirement to undertake a regional water supply and monitoring investigation. The ability of MCM to access and use water balance and monitoring information from the other mines is entirely dependent on MCM reaching an agreement with these mines to share and use their data. Since exhibition of the Stage 2 EA, MCM has entered into a water sharing agreement with the Ulan coal mine and has data sharing agreements in place with both Ulan and Wilpinjong coal mines. Notwithstanding, all publicly available water data was used in the Stage 2 assessment of cumulative impacts from mining on the water resources of the surrounding area (EA Appendix 5).

When completed, MCM will use the outcomes of the regional water supply and monitoring investigation to inform the development of a detailed monitoring network in conjunction with the other mines to ensure that cumulative impacts of mining on surrounding water sources (surface water and groundwater) is effectively and efficiently monitored.

2.4.5 Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources

Issue

- The DWE requires that the operating rules of the Water Sharing Plan for the Hunter unregulated and alluvial water sources be incorporated into any mitigation or management measures.
- Options for the management of Splitters Creek Dam must be considered in terms of the limitations and dealings rules permitted under the Water Sharing Plan for the Hunter unregulated and alluvial water sources.

Response

The Water Sharing Plan for the Hunter unregulated and alluvial water sources commenced on 1 August 2009. Moolarben Coal Mines will abide by the rules of the Water Sharing Plan, where it relates to those water sources described by the plan that may be accessed or impacted by MCM during the construction and operation of Stage 2, and for the duration of the MCP, including management of the Splitters Hollow Dam.

2.5 Ecology

2.5.1 Protection of Natural Values

Issues

- Financial gains of development should not override consideration of the impact on the environment.
- The opening of a new mine does not justify the destruction of ecology, especially the destruction of mature vegetation habitat, which cannot be mitigated.
- The MCP is likely to compromise the ability of the Hunter-Central Rivers Catchment Management Authority and the NSW government to meet their short-term Catchment Action Plan and State Plan targets, respectively.
- The Drip and adjacent escarpments should be protected by being included in the Goulburn River National Park.

Response

Short-term ecological impacts are an unavoidable consequence of mining development. Moolarben Coal Mines has avoided areas containing ecologically important values where possible. Moolarben Coal Mines is committed to establishing, restoring and enhancing terrestrial and aquatic values to achieve a 'maintain and improve' outcome in the area. In the long-term, it is expected that a mature rehabilitated landscape will create connected areas that have sustainable ecological conditions that support local biodiversity values.

Moolarben Coal Mines will implement a comprehensive ecological offset package that will result in a net ecological gain (EA Sections 5.7, 5.18 and 5.19 and Section 2.5.3).

The MCP may have a minor effect on the short-term Catchment Action Plan (HCRMA, 2007) and State Plan targets (DECC, 2008), but due to the proposed revegetation, ecological enhancements and offsets, the project will achieve a long-term ecological benefit. These long-term benefits include increasing biodiversity, decreasing soil salinity and improving surface water quality in the Murragamba, Eastern and Wilpinjong creek catchments, which are in line with the Catchment Action Plan and State Plan objectives and targets.

As discussed in Section 2.3.2, MCM generally supports the inclusion of the riparian corridor, including the Goulburn River, the Drip and adjacent sandstone cliffs into the Goulburn River National Park.

2.5.2 Loss of Habitat

Issues

- Loss of good condition, intact habitat for threatened species cannot be compensated. Most of the habitats for woodland birds such as Jacky Winter and Restless Flycatcher are highly degraded in NSW, but remnants in the Murragamba Valley are in particularly good condition and should not be destroyed.
- No loss of any endangered ecological community (EEC) and critically endangered ecological community (CEEC) (especially woodland vegetation communities) is acceptable and these communities cannot be offset.

Response

Progressive mining and rehabilitation, including temporary enhancement of degraded lands ahead of mining, will be undertaken. The net effect will be to generally maintain the availability of habitats for woodland birds as mining and rehabilitation is progressed.

Moolarben Coal Mines is committed to offsetting the loss of EECs and CEECs (EA Section 6) and has proposed a number of measures to offset the impacts of Stage 2 (Section 2.5.3, EA Sections 5.7, 5.18 and 5.19). This includes long-term protection through dedication of existing off-site areas of EEC and CEEC to the National Estate, enhancement of currently degraded off-site areas of EEC and CEEC and rehabilitation of the site with EEC and CEEC species.

2.5.3 Rehabilitation Mitigation, Management and Monitoring

Issues

- Detailed mitigation measures need to be provided, in particular for displaced wildlife. The EA report should have quantitatively demonstrated that the proposed mitigation measures will actually improve or maintain environmental outcomes.
- Mine rehabilitation and regeneration will be over a very long time scale in terms of replacing lost habitat, feeding and nesting grounds for a range of listed threatened species.
- The environmental management measures and monitoring outlined in EA Tables 6.1 and 6.2 need to be more rigorous and also need to be laid out clearly in the approval conditions.
- The long-term rehabilitation of subsided land should be included in the mitigation and mine closure plans.
- Stage 2 should be delayed until Stage 1 is completed so that the proposed revegetation and rehabilitation of the Stage 1 footprint will have time to establish before the Stage 2 clearing of mature, threatened vegetation occurs.

Response

Moolarben Coal Mines will prepare a landscape management plan for Stage 2 which details the biodiversity mitigation, management and monitoring measures described in the EA (EA Sections 5.7 and 5.18) prior to commencement of mining in Stage 2. This plan will include specific rehabilitation objectives for Stage 2 and will be integrated with the landscape management plan for Stage 1.

The mitigation and rehabilitation of areas affected by subsidence will be included in the landscape management plan and in the subsidence management plan for Stage 2.

Rehabilitation of mine-disturbed areas will occur progressively over the life of the complex. At any time, only a portion of the Stage 1 and Stage 2 open cut mine areas will be disturbed. Mine-disturbed areas will be rehabilitated with native woodland (including EEC and CEEC species), shrubland and grassland. Other cleared and degraded areas on MCM-owned land outside the mine disturbance footprint will be revegetated and rehabilitated with native vegetation. These mitigation and rehabilitation measures will provide a greater amount of habitat throughout what is currently a cleared and fragmented landscape (EA Section 5.7 and Section 5.18).

2.5.4 Impacts on the National Estate

Issues

- Impacts on the adjacent reserves from groundwater extraction, noise and blasting, lighting, dust, vehicle emissions, and subsidence have not been addressed, in particular, in relation to impacts on flora and fauna (especially nocturnal fauna).
- There are no proposals within the EA report to monitor impacts within the National Estate.
- The increased territorial pressure on feeding and breeding grounds in the reserves from displaced fauna populations has not been assessed.

Response

Impacts on the adjacent reserves from air quality (EA Section 5.1 and Response to Submissions Report – Part A Section 3.1.2), noise and blasting (EA Section 5.3 and Response to Submissions Report – Part A Sections 3.1.5 and 3.3.1), groundwater (Section 2.2.4 and EA Section 5.4), surface water (EA Section 5.5), ecology (EA Section 5.7) and subsidence (Section 2.5.5 and EA Section 5.8), among other issues, are addressed in Section 5 of the EA and in the Response to Submissions Reports (Parts A and B).

As discussed in Section 2.2.4, the ecological values conserved in the Goulburn River National Park (and Munghorn Gap Nature Reserve) do not depend on groundwater resources within the Stage 2 area. The Stage 2 Project Area is not hydraulically connected with the Goulburn River National Park and, therefore, no effect is predicted. Stage 2 groundwater sources are down dip from the Munghorn Gap Nature Reserve and, therefore, impacts on ecosystems within the reserve, due to changes in groundwater, are unlikely (Sections 2.2.3 and 2.2.4).

The average setback distance between the Stage 2 disturbance footprint and the Munghorn Gap Nature Reserve will be between 200 and 250 m (EA Section 5.7). Moolarben Coal Mines commits to maintaining a setback of at least a 50 m to the Munghorn Gap Nature Reserve.

Noise impacts in the Goulburn River National Park and the Munghorn Gap Nature Reserve were assessed against the INP amenity noise criteria and the Stage 1 Project Approval noise impact assessment criterion of 50 dB(A) ($LA_{eq(15)}$). No noise above this criterion was predicted for the Goulburn River National Park. Noise in excess of 50 dB(A) was predicted in the vicinity of the northern boundary of the Munghorn Gap Nature Reserve. Noise may have a short-term impact on sensitive fauna species inhabiting the Munghorn Gap Nature Reserve when open cut mining progresses closest to the northern boundary during maximum production (EA Appendix 7). There are no guidelines or established criterion that provides guidance to the level of noise or vibration (blast overpressure) to which fauna would experience annoyance or harm. It is expected that noise and blasting could impact some fauna species that inhabit areas in close proximity to OC4. However, most fauna species encountered in the area are highly mobile and would, therefore, be expected to temporarily move away from the immediate area of noise generating activities.

Night lighting impacts will be primarily concentrated on the MCP infrastructure area, the OC4 working area and access roads. Potential impacts of lighting associated with Stage 2 on fauna are likely to relate to alteration of forage zones, primarily for insectivorous bird and bat species. Moolarben Coal Mines has committed to implementing a suite of measures to manage night lighting such as focussing lights on working areas and shielding stray light (EA Section 5.13.6), which will reduce light impacts on fauna in the adjacent reserves.

Dust impacts will be experienced at the Munghorn Gap Nature Reserve when open cut mining progresses closest to the northern boundary (EA Section 5.7 and Response to Submissions Report – Part A Section 3.1.2). The monitoring of dust deposition on the Munghorn Gap Nature Reserve will be considered as part of the air quality monitoring program. Vehicle emissions are dispersed across a large area and will dissipate rapidly. Therefore, they are not expected to have any impact on flora or fauna.

The Goulburn River National Park is about 1,400 m from UG1 (Longwall 5) and, therefore, there will be no subsidence impacts from Stage 2 on this park (EA Section 5.8). A barrier of unmined coal to the south and east of the proposed UG2 longwall panels will be left to protect the cliff lines in the Munghorn Gap Nature Reserve (EA Section 5.8). The nearest edge of UG2 (Longwall 10) will be approximately 140 m from the reserve. This is a sufficient distance to ensure that no direct surface subsidence effects from Stage 2 will impact on the reserve (EA Section 5.8 and EA Appendix 8).

Moolarben Coal Mines will implement appropriate management measures to ensure that Stage 2 will not lead to inappropriate fire regimes, road kills, introduction of weeds, pathogens or feral animals at either reserve. A fence will be installed along the boundary of the Munghorn Gap Nature Reserve adjacent to the Stage 2 Project Area, and the design and operation of OC4 will aim to minimise any impacts on the nature reserve. Air quality monitoring will include dust monitoring adjacent to the Munghorn Gap Nature Reserve (Response to Submissions Report – Part A Section 3.1.2).

Increased territorial pressure on feeding and breeding grounds in the Goulburn River National Park and Munghorn Gap Nature Reserve from displaced fauna populations is not anticipated. The progressive nature of vegetation clearing and rehabilitation ahead and behind the active mine area and temporary improvement of existing degraded areas ahead of mine disturbance will limit the loss of available fauna habitat. Furthermore, rehabilitation and enhancement of ecological values on existing disturbed areas outside the mine disturbance footprint will increase available habitat.

2.5.5 Subsidence Impacts on Ecology

Issues

- Subsidence is listed as a key threatening process under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and should be discussed in the EA report.
- The impacts of subsidence on CEEC, water sources and threatened species has been understated in the EA, particularly in the context of cumulative impacts from Stage 1 and Ulan mines.

Response

Moolarben Coal Mines acknowledges that alteration of habitat following subsidence due to longwall mining is listed as a key threatening process under the TSC Act. This was considered in the EA and management, monitoring and mitigation measures are proposed to reduce the potential loss of habitat from surface subsidence effects (EA Section 5.8 and EA Appendix 7). This includes enhancing and rehabilitating areas affected by subsidence and supplementing loss of tree hollows with nesting boxes.

The occurrence of EEC (and CEEC) above UG1 and UG2 is largely confined to ridge and spur line areas away from steep slopes and where the depth of cover to underground workings is greater than 100 m. There is also an association in the occurrence of EEC (and CEEC) with a basalt substrate,

which is expected to resist subsiding as a result of underground mining (EA Section 5.8). Threatened bird species may be indirectly affected by subsidence where their habitat changes (e.g., loss of tree hollows) as a result of surface subsidence effects. Threatened species (fauna and flora) that occupy the valley floor will not be directly affected by underground mining of the ridges. Hence, impacts on EEC (and CEEC) and threatened species as a result of Stage 2 subsidence effects is expected to be minor. Moolarben Coal Mines is committed to mitigate the impacts of Stage 2 underground mining on EEC (and CEEC) and native vegetation through such measures as ground stabilisation works, erosion control, revegetation of affected areas and inclusion of nesting boxes (EA Section 5.7 and 5.8).

The Triassic-age sandstone units above UG1 and UG2 are dry (Section 2.2.5 and EA Appendix 5), hence, there will be no loss of groundwater from the Triassic-age aquifer as a result of Stage 2 underground mining. Drainage lines above UG1 and UG2 are low order ephemeral systems that respond rapidly to convey recent rainfall from the ridges to the valley floor catchment areas (Section 2.3.9 and EA Appendix 6A). These drainage lines are rapidly draining and do not pond or store surface water for any length of time and have no baseflow component. Some loss of flows during recent rainfall will occur as a result of surface cracking of drainage lines from underground mining. However, this is expected to be minor (Section 2.3.9 and EA Section 5.5).

The impacts of Stage 1 underground mining were assessed in the Stage 1 EA (Wells Environmental Services, 2006b), which has been approved. The cumulative impact of Stage 2, Stage 1 and the Ulan coal mine on ground and surface water sources has been assessed (EA Section 5.4, 5.5 and 5.8 and EA Appendix 5, 6A and 8). The impact of Stage 2 on flora and fauna (including EEC, CEEC and threatened species) has been considered in its regional context (EA Section 5.7 and EA Appendix 7).

2.5.6 Groundwater Dependent Ecosystems

Issues

- MWRC is concerned about the removal of two groundwater-dependent ecosystems (GDEs).
- Mining operations are drawing down regional groundwater supplies, which is impacting natural springs and other GDEs.

Response

Most of the springs and groundwater seeps in the Murragamba and Eastern creek valleys have been degraded or modified by intensive agricultural activities or dug out to provide in-line stock watering dams. These GDEs range in size from about 0.01 to 0.2 ha and support a variety of plant species including sedges, Narrow-leaved Goodenia, Sundews and Bladderwort (EA Appendix 7). Where these small constructed GDEs occur within the footprint of OC4 they will be permanently removed as a result of mining. These small degraded GDEs do not support species of conservation interest (EA Section 5.7)

Eastern Creek valley hosts two larger spring-fed GDEs, one at the head of the valley, the other along the lower reaches of Eastern Creek. The GDE located at the head of the valley comprises vegetation species similar to that found at other GDEs in the Murragamba and Eastern creek valleys. This GDE will not be impacted by mining. The other spring-fed GDE along the lower reaches of Eastern Creek will be impacted by mining in OC4.

As discussed in Section 2.2.4, changes in groundwater levels as a result of Stage 2 will not impact on springs or ecosystems (including GDEs) within the Goulburn River National Park or Munghorn Gap Nature Reserve.

2.5.7 Creek Diversions

Issues

- The loss of 11 km of creek habitat in Murragamba Creek and Eastern Creek, including a further 7% of flow in Wilpinjong Creek, will impact on the availability of natural water supply, especially in times of low flow, for fauna species using or travelling between the reserves.
- The construction of any creek bed diversion must be stable and successfully vegetated with locally appropriate species before the natural creek beds are altered in any way. The ecological integrity and geomorphologic and hydraulic stability of reconstructed creek beds should be confirmed by independent experts before any mining of the existing creeks is allowed.
- The examples of vegetation species suggested for planting the creek beds during the creek realignment process (EA Appendix 6A Table 24) are inappropriate and not native to this upland catchment.
- Stage 2 will undermine the efforts and investments of many non-government groups and State and federal governments, which are trying to improve the condition of communities and habitats. Specifically, the Commonwealth government has committed $43.5 million in the Caring for Country Program for the rehabilitation of the CEEC threatened by Stage 2.
- The Hunter-Central Rivers CMA stated that the EA did not address the loss of in-stream biodiversity during the construction, diversion and eventual alignment of the waterways.

Response

As discussed in Section 2.3.5, Murragamba and Eastern creeks are ephemeral systems and there is insufficient baseflow to maintain surface flows during low rainfall periods. Mining and the realignment of Murragamba and Eastern creeks will occur in a progressive manner and environmental flows discharging from the Murragamba and Eastern creek catchments will be maintained by MCM until these drainage systems are restored to a stable condition (EA Sections 5.5 and 6). Hence, there will be no loss of natural water supply for fauna species using or travelling between the Goulburn River National Park and Munghorn Gap Nature Reserve. Aquatic habitat will be reinstated in the realigned creeks and aquatic species within the existing creeks will be recovered and relocated to functioning areas of the realigned creeks.

Moolarben Coal Mines has committed to fully rehabilitating the disturbed creek beds using endemic species and fauna habitat salvaged from impacted areas of the creeks. A combination of native shrubs, herbs, native grasses and tree species will be used for replanting the creek beds. A detailed creek rehabilitation plan (including rehabilitation of aquatic habitat) will be prepared in consultation with DWE and DPI-Fisheries to guide the creek rehabilitation and restoration process. Creek realignment works will be undertaken progressively to achieve a geomorphologically and hydrologically stable channel, which will be rehabilitated to improve the aquatic and terrestrial habitat and maintain environmental flows (EA Section 5.5 and 5.18).

Moolarben Coal Mines will increase the riparian species diversity of the realigned creeks above currently existing creek conditions, which are degraded as a result of former land use practices (e.g.,

cattle grazing and trampling). The vegetation species that will be used for rehabilitating the lower, mid and upper banks includes *Arundinella nepalensis* and *Melaleuca thymifolia* on the lower banks; *Melaleuca thymifolia* (on clayey soils), *Leptospermum polygalifolium* (on sandy soils), Shorthair Plumegrass, *Lomandra confertifolia*, kangaroo grass, Blakely's Redgum and Rough-barked Apple on the mid banks; and Blakely's Redgum (on clayey soils), Yellow Box, Grey Box *Acacia spectablis / polybotria* (on sandy soils), *Acacia decora / Daveisia genistifolia* (on clayey soils), kangaroo grass and Rough-barked Apple (*Angophora floribunda*) (on sandy soils) on the upper banks.

Channel stability is a major consideration in the design of the realigned channels. The creek bases will be seeded with native grasses to provide erosion protection, and additional structural measures including the use of rip-rap will control bed and bank scour channel erosion. Artificial riffle and pool sequences will be constructed along the realigned channels. In shallower areas, a mix of rock, gravel and river sand will be used to anchor the bed sediments (EA Section 5.5.6). The new creek alignments will be constructed in sufficient time to allow the channel to stabilise before water is introduced into the new alignment.

The concept design for the creek realignments (EA Section 5.5 and EA Appendix 6A) considers geomorphic features, stream ecology, riparian habitat and flood design, and aims to achieve geomorphologically and hydrologically stable channels. Measures will be incorporated into the creek design to allow the realigned creeks to mimic a natural creek, to increase habitat and diversity, and minimise erosion. This includes incorporating meanders to replicate the characteristics of the existing creek channels, and utilising fauna habitat salvaged from impacted areas in the realigned channels. The concept design aims to create ecologically diverse realigned creeks, with improved water quality and aquatic and terrestrial habitats when rehabilitated (EA Section 5.5).

To the company's knowledge, no government or private funding or efforts have been previously allocated or undertaken to improving the riparian and aquatic habitat in Murragamba Creek or Eastern Creek.

In addition to reinstating and rehabilitating sections of creek that will be disturbed by mining, MCM has committed to rehabilitating those areas of the Murragamba and Eastern creeks that will not be disturbed by mining (EA Sections 5.5, 5.7 and 5.18).

2.5.8 Cumulative Ecological Impacts

Issues

- Cumulative impacts from current and approved mining operations and powerlines adjacent to Goulburn River National Park and Munghorn Gap Nature Reserve were not considered or were not adequately considered as part of the EA report, including loss of habitat and disruption of connectivity and green corridors (local scale and Great Eastern Ranges scale).
- The proposal to clear a further 157 ha of CEEC additional to the 69 ha approved for Stage 1, 47 ha approved for Wilpinjong coal mine and 57 ha approved for Wollar-Wellington Transmission Line, has not been quantified in the EA as a cumulative impact on this threatened ecosystem.

Response

While open cut mining will be a spatially dominant feature in the local landscape during mining, both mining and rehabilitation will occur in a progressive manner (Section 2.5.3), as illustrated in EA Plans 5 to 10. This will reduce the cumulative impact on habitat loss.

Mine sequencing will temper the severance of connectivity between the National Estates. Permanent and temporary movement corridors between the Goulburn River National Park and the Munghorn Gap Nature Reserve will maintain genetic flow at a regional scale (EA Section 5.7.6). Vegetation will be retained or improved to create movement pathways between the conservation reserves. The progressive rehabilitation of mine impacted areas, combined with the revegetation of cleared lands outside the mine disturbance footprint, will have the effect of increasing connectivity between the Goulburn River National Park and the Munghorn Gap Nature Reserve. It will also provide increased habitat throughout what is currently a cleared and fragmented landscape.

While there is a cumulative impact on native vegetation as a result of mining and infrastructure development, each mining and infrastructure development project has been individually assessed on its merits. This includes detailed assessment of environmental impacts through the respective EA reports and technical studies; the consideration of public and agency submissions to these proposals; the review and assessment of each project by government departments; and the issuing of prescriptive conditions of approval and licences. The impact of each of these projects on surrounding ecological values individually and cumulatively has therefore been considered.

2.5.9 Biodiversity Offsets

Issues

- The loss of high conservation value vegetation and biodiversity has not been adequately offset.
- Offsetting requires increased security and should only proceed if an appropriate legal mechanism or instrument is used to permanently secure the area and enforce the required actions.
- The management of offset areas is required in terms of threats, time-lag effects, and the uncertainties and risks associated with actions such as revegetation.
- The Murragamba and Eastern creek valleys should be kept as an offset for the surrounding mines and are better suited to maintain and improve the unique biodiversity values of the healthy woodland communities and CEECs approved for clearance in Stage 1. The offset agreed to for the Stage 1 clearing of 69 ha was an exceptionally poor outcome.

Response

Moolarben Coal Mines is in discussion with government agencies on the biodiversity mitigation and offset package for Stage 2. This will be reported as soon as agreement has been reached.

Moolarben Coal Mines is committed to ensuring that its offsets are protected in the long-term. This will be achieved through a range of measures including dedications to the National Estate, Voluntary Conservation Agreements, or through protection under the *Native Vegetation Act 2003* (EA Section 6.2).

Moolarben Coal Mines acknowledges that there are uncertainties associated with revegetation outcomes and is committed to develop rehabilitation completion criteria in consultation with government agencies, including monitoring to ensure that the agreed rehabilitation objectives are met.

The biodiversity impacts of Stage 1 were assessed in the EA for Stage 1 (Wells Environmental Services, 2006b), which has been approved.

2.5.10 Inadequacies with the Ecological Impact Assessment

- The Department of Environment, Water, Heritage and the Arts (DEWHA) stated that the following items need clarification within the ecology assessment of the EA report:
  - EA Table 5.7.5 does not list all the species that are most likely to be impacted. For example, EA Volume 4 (Appendix 7) Section 9.1.2 states that the Eastern Long-eared Bat has a high likelihood of being impacted by the development, yet this species is not mentioned in the table.
  - Specific management measures for each EPBC Act listed species is required as the impact management section of the EA is too vague.
  - EA Volume 4 (Appendix 7) Section 9.2 needs to clearly state which EPBC Act matters are being affected, including clarification on:
    - Area and quality of habitat of each species being impacted.
    - Proportion of regional habitat for this species being impacted.
    - Regional importance of the habitat (e.g., wildlife corridor).
  - In EA Volume 4 (Appendix 7), information on the Regent Honeyeater on page 121 contradicts information on page 156. Similarly, information on the Spotted-tailed Quoll on page 122 contradicts information on page 158.

Response

The DEWHA has correctly noted that EA Table 5.7.5 does not contain all threatened flora species likely to be impacted by Stage 2. Similarly, EA 5.7.6 did not include the Eastern Long-eared Bat. However, a full species list is included in the ecological impact assessment in EA Appendix 7. Notwithstanding, Tables 2.3 and 2.4 following, provide a complete list of all threatened species (i.e., TSC Act and EPBC Act listed species) considered in the ecological impact assessment for Stage 2. These tables also include references to the species-specific management and mitigation measures described in EA Appendix 7. A summary of the area, quality and importance of habitat for each of the seven EPBC Act listed fauna species potentially impacted by Stage 2 is provided in Table 2.5.

Table 2.3 Likelihood of impact on threatened flora species and habitat

Common name (*Scientific name*)	**TSC Act**	**EPBC Act**	**Species Identified**	**Known / Potential Habitat Identified**	**Impact on Potential Habitat**	**Impact on Known Habitat**	**Management Measures**
White Flowered Wax Plant (*Cynanchum elegans*)	E1	E	N	N	None	None	None required
Hoary Sunray (*Leucochrysum albicans var tricolor*)		E	N	N	None	None	None required
Ozothamnus tessellatus	V	V	N	N	Low	None	None required
Ausfield's Wattle (*Acacia ausfieldii*)	V	-	N	N	Low	None	Not listed on the EPBC Act
Flockton Wattle (*Acacia flocktoniae*)	V	V	N	N	None	None	None required
Weeping Myall of the Hunter Catchment *Acacia pendula*)	E2	E	N	N	None	None	None required

Table 2.3 Likelihood of impact on threatened flora species and habitat (cont'd)

Common name (*Scientific name*)	**TSC Act**	**EPBC Act**	**Species Identified**	**Known / Potential Habitat Identified**	**Impact on Potential Habitat**	**Impact on Known Habitat**	**Management Measures**
Kennedia retrorsa	V	V	N	N	None	None	None required
Swainsona recta	E1	E	N	N	Mod-High	None	None required
Cannons Stringybark (*Eucalyptus cannonii*)	V	V	N	N	Mod-High	None	None required
River Redgum of the Hunter Catchment (*Eucalyptus camaldulensis*)	E2	-	N	N	None	None	Not listed on the EPBC Act
Eucalyptus scoparia	E1	V	N	N	None	None	None required
Pokolbin Mallee (*Eucalyptus pumila*)	V	V	N	N		None	None required
Homoranthus darwinioides	V	V	N	N	Low	None	None required
Tiger Orchid of the Hunter Catchment (*Cymbidium canaliculatum*)	E2	-	N	N	High	None	Not listed on the EPBC Act
Painted Diuris (*Diuris tricolor* (syn *D. sheiffiana*))	V	V	N	N	High	None	None required
Snake Orchid (*Diuris pedunculata*)	E1	E	N	N	None	None	None required
Digitaria porrecta	V	V	N	N	None	None	None required
Silky Pomaderris (*Pomaderris sericea*)	V	V	N	N	None	None	None required
Scant Pomaderris (*Pomaderris queenslandica*)	E1	-	N	N	Mod	None	Not listed on the EPBC Act
Denman Pomaderris (*Pomaderris reperta*)	E1	CE	N	N	None	None	None required
Prostanthera discolor	V	V	N	N	None	None	None required
Prostanthera cineolifera	V	V	N	N	None	None	None required
Prostanthera cryptandroides	V	V	N	N	None	None	None required
Prostanthera stricta	V	V	N	N	None	None	None required
Philotheca ericifolia	V	V	N	N	None	None	None required
Commersonia rosea	E1	E	N	N	None	None	None required
Lasiopetalum longistamineum	V	V	N	N	None	None	None required
Rulingia procumbens	V	V	N	N	None	None	None required
Austral Toadflax (*Thesium australe*)	V	V	N	N	Low	None	None required
Wollemi Pine (*Wollemia nobilis*)	E1	E	N	N	None	None	None required

Table 2.4 Likelihood of impact on threatened fauna species and habitat

Common name ***(scientific name)***	**TSC Act**	**EPBC Act**	**Species Identified**	**Known / Potential Habitat Identified**	**Impact on Potential Habitat**	**Impact on Known Habitat**	**Management Measures**
Booroolong Frog *(Litoria booroolongensis)*	E1	E	N	N	None	None	None required
Giant Barred Frog *Mixopheyes terates)*	E1	E	N	N	None	None	None required
Pink-tailed Worm Skink *Aprasia parapulchella)*	V	V	N	N	None	None	None required
Collared Whipsnake *(Suta flagellum)*	V	-	N	N	None	None	None required
Broad-headed Snake *(Hollocephalus bungaroides)*	E1	V	N	N	None	None	None required
Malleefowl *(Leipoa ocellata)*	E1	E	N	Y	Low	None	None required
Bush Stone-curlew *(Burhinus grallaerius)*	E1	-	N	Y	Low-Mod	None	Not listed on the EPBC Act
Square-tailed Kite *(Lophoictinia isura)*	V	-	Y	Y	Mod-High	Mod	Not listed on the EPBC Act
Australian Painted Snipe *(Rostratula australis)*	V	V	N	N	None	None	None required
Gang-gang Cockatoo *(Callocephalon fimbriatum)*	V	-	Y	Y	Low	Low	Not listed on the EPBC Act
Glossy Black Cockatoo *(Calyptorhynchus lathami)*	V	-	Y	Y	Low-Mod	Low-Mod	Not listed on the EPBC Act
Swift Parrot *(Lathamus ternaur)*	E1	E	N	Y	Low	None	EA Appendix 7 Section 10.4.2, Section 10.5.1
Turquoise Parrot *(Neophema pulchella)*	V	-	N	Y	Low-Mod	None	Not listed on the EPBC Act
Superb Parrot *(Polytelis swansonii)*	V	V	N	N	None	None	None required
Powerful Owl *(Ninox terna)*	V	-	Y	Y	Low-Mod	Low	Not listed on the EPBC Act
Barking Owl *(Ninox connivens)*	V	-	N	Y	Mod-High	None	Not listed on the EPBC Act
Masked Owl *(Tyto novaehollandiae)*	V	-	N	Y	Low-Mod	None	Not listed on the EPBC Act
Gilbert's Whistler *(Pachycephala inornata)*	V	-	Y	Y	Mod	Low	Not listed on the EPBC Act
Brown Treecreeper *(Climacteris picumnus)*	V	-	Y	Y	High	High	Not listed on the EPBC Act

Table 2.4 Likelihood of impact on threatened fauna species and habitat (cont'd)

Common name (*Scientific name*)	**TSC Act**	**EPBC Act**	**Species Identified**	**Known / Potential Habitat Identified**	**Impact on Potential Habitat**	**Impact on Known Habitat**	**Management Measures**
Speckled Warbler *(Pyrrholaemus sagittatus)*	V	-	Y	Y	High	High	Not listed on the EPBC Act
Regent Honeyeater *(Anthochaera phyrgia)*	E1	E	N	Y	Mod-High	None	EA Appendix 7 Section 10.4.2, Section 10.5.1
Black-chinned Honeyeater *(Melithreptus gularis gularis)*	V	-	Y	Y	Mod-High	Mod-High	Not listed on the EPBC Act
Painted Honeyeater *(Grantiella picta)*	V	-	Y	Y	High	High	Not listed on the EPBC Act
Hooded Robin *(Melanodryas cucullata)*	V	-	Y	Y	High	High	Not listed on the EPBC Act
Grey-crowned Babbler *(Pomatostomus temporalis temporalis)*	V	-	Y	Y	High	High	Not listed on the EPBC Act
Diamond Firetail *(Stagnopleura guttata)*	V	-	Y	Y	High	High	Not listed on the EPBC Act
Spotted-tailed Quoll *(Dasyurus maculatus)*	E1	E	N	Y	Mod	None	EA Appendix 7 Section 10.4.2, Section 10.5.1
Koala *(Phascolarctos cinereus)*	V	-	N	Y	Low-Mod	None	Not listed on the EPBC Act
Squirrel Glider *(Petaurus norfolcensis)*	V	-	N	Y	Mod-High	None	Not listed on the EPBC Act
Brush-tailed Rock-wallaby *(Petrogale penicillata)*	E1	V	N	Y	Low-Mod	None	EA Appendix 7 Section 10.4.2, Section 10.5.1
Large-eared Pied Bat *(Chalinobolus dwyeri)*	V	V	Y	Y	Mod-High	Mod-High	EA Appendix 7 Section 10.4.2, Section 10.5.1
Little Pied Bat *(Chanilobolus pictus)*	V	-	Y	Y	High	High	Not listed on the EPBC Act
Eastern Bentwing Bat *(Miniopterus schreibersii)*	V	-	Y	Y	Low-Mod	Low	EA Appendix 7 Section 10.4.2, Section 10.5.1
Large-footed Myotis *(Myotis adversus)*	V	-	N	Y	Mod-High	None	Not listed on the EPBC Act
Eastern Long-eared Bat *(Nychophilus timoriensis)*	V	V	N	Y	Mod-High	None	EA Appendix 7 Section 10.4.2, Section 10.5.1
Yellow-bellied Sheathtail-bat *(Saccolimus flaviventris)*	V	-	Y	Y	Mod-High	Mod-High	Not listed on the EPBC Act

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Table 2.5 Habitat area, quality and importance of EPBC Act fauna species potentially impacted by Stage 2

Species	Estimated Habitat Area (ha)	Method[1] of Habitat Estimation	Factors / Vegetation Types influencing Area of Habitat	Habitat Quality	Habitat Importance
Swift Parrot	261	Vegetation type.	Blakely's Redgum–Yellow Box–Apple Forest; Lowland Box–Redgum; Grassy White Box Woodland; Shrubby White Box Forest.	Potential foraging habitat (no known habitat present). Moderate to good condition (i.e., presence of nectar producing winter - flowering eucalypts known to be used by this species).	Western slopes vegetation types are historically of high importance for the Swift Parrots winter migration. The vegetation of the Stage 2 Project Area is located nearby known foraging grounds for this species. The capacity of this species to move throughout southeastern Australia would indicate the Stage 2 Project Area as a potential foraging ground and movement corridor.
Regent Honeyeater	323	Vegetation type.	Blakely's Redgum–Yellow Box–Apple Forest; Lowland Box–Redgum; Grassy White Box Woodland; Shrubby White Box Forest; Blakely's Redgum–Rough-barked Apple Woodland.	Potential foraging and breeding habitat (no known habitat present). Moderate to good condition (i.e., presence of nectar-producing winter flowering eucalypts known to be used by this species) although these potential habitat areas are small and fragmented.	The Stage 2 Project Area contains potential foraging and breeding habitat in close proximity to known core breeding areas (i.e., Cumbo Creek and Wollar to the east, Munghorn Gap to the south and Capertee Valley to the southeast). While there is no current known utilisation of the Stage 2 Project Area by this species, the contained potential habitat values could allow breeding activity. The value of the Stage 2 Project Area as a movement corridor is considered low given the preference for eastern migrations to the coast rather than to the northwest.

Table 2.5 Habitat area, quality and importance of EPBC Act fauna species potentially impacted by Stage 2 (cont'd)

Species	Estimated Habitat Area (ha)	Method[1] of Habitat Estimation	Factors / Vegetation Types influencing Area of Habitat	Habitat Quality	Habitat Importance
Brush-tailed Rock Wallaby	135	Total length of rock outcrop x 150 m width.	Nine km of 'rocky outcrops' that coincide with native vegetation cover.	Potential foraging and breeding habitat (no known habitat present). Low condition (i.e., cliff lines and rock outcrops are discontinuous and small in area; presence of wild dogs and foxes).	The potential habitat values of the Stage 2 Project Area are of low importance to the Brush-tailed Rock Wallaby. The nature of rocky outcrops throughout the Stage 2 Project Area is considered sub-optimal and partially compromised by the proximity of agricultural lands and the presence of foxes and wild dogs.
Spotted-tailed Quoll	1175	Vegetation type.	Blakely's Redgum–Yellow Box–Apple Forest; Lowland Box–Redgum; Grassy White Box Woodland; Shrubby White Box Forest; Blakely's Redgum–Rough-barked Apple Woodland; Rough-barked Apple–Banksia Woodland; Footslope Ironbark–Gum–Box; Lowland Ironbark Forest.	Potential foraging habitat (no known habitat present) and movement corridors between Munghorn Gap Nature Reserve and Goulburn River National Park. Low to moderate condition (i.e., dominant presence of agricultural activities in potential movement and foraging areas; presence of wild dogs and foxes).	In terms of movement corridors it is considered that the Stage 2 Project Area is of moderate to high value for the Spotted-tailed Quoll (i.e., assumption being that the Spotted-tailed Quoll is located within Goulburn River National Park and Munghorn Gap Nature Reserve). While partially compromised by the proximity of agricultural lands (i.e., presence of foxes and wild dogs), it is considered that the abundance of woodland birds and presence of medium sized prey (e.g., possums) provide suitable foraging grounds for this species throughout the larger intact areas of native vegetation. It is predicted that the Stage 2 Project Area contains low-moderate value breeding habitat with improved habitat values located in upland areas adjacent the conservation reserves.

Table 2.5 Habitat area, quality and importance of EPBC Act fauna species potentially impacted by Stage 2 (cont'd)

Species	Estimated Habitat Area (ha)	Method[1] of Habitat Estimation	Factors / Vegetation Types influencing Area of Habitat	Habitat Quality	Habitat Importance
Large-eared Pied Bat	45 (roost) 1175 (foraging)	Total length of rock outcrop x 50 m width. Vegetation type.	Nine km of 'rocky outcrops' that have potential to yield cracks, crevices and caves. Blakely's Redgum–Yellow Box–Apple Forest; Lowland Box–Redgum; Grassy White Box Woodland; Shrubby White Box Forest; Blakely's Redgum–Rough-barked Apple Woodland; Rough-barked Apple–Banksia Woodland; Footslope Ironbark–Gum–Box; Lowland Ironbark Forest.	Foraging and potential breeding habitat (breeding habitat not known) and movement corridors between Munghorn Gap Nature Reserve and Goulburn River National Park. Moderate foraging conditions (i.e., riparian vegetation for foraging although fragmented across the landscape). Low breeding conditions (i.e., cliff lines and rock outcrops in the Stage 2 Project Area provide poor cave conditions – few potential roost sites).	The vegetated riparian parts of the Stage 2 Project Area are considered to be of high importance to foraging populations of the Large-eared Pied Bat as these areas promote increased insect activity. Roost habitat values are of low value throughout the Stage 2 Project Area, as much of the rocky outcrops provide a limited availability of suitable cracks, crevices and caves. The majority of suitable roost sites are located within the Goulburn River National Park. Other large areas of intact native vegetation, such as the Munghorn Gap Nature Reserve, also represent potential foraging and roost areas, with the site being an important connection between the Munghorn Gap and Goulburn River conservation areas.

Table 2.5 Habitat area, quality and importance of EPBC Act fauna species potentially impacted by Stage 2 (cont'd)

Species	Estimated Habitat Area (ha)	Method[1] of Habitat Estimation	Factors / Vegetation Types influencing Area of Habitat	Habitat Quality	Habitat Importance
Eastern Bentwing Bat	1175 (foraging)	Vegetation type.	Blakely's Redgum–Yellow Box–Apple Forest; Lowland Box–Redgum; Grassy White Box Woodland; Shrubby White Box Forest; Blakely's Redgum–Rough-barked Apple Woodland; Rough-barked Apple–Banksia Woodland; Footslope Ironbark–Gum–Box; Lowland Ironbark Forest.	Known foraging habitat and movement corridors between Munghorn Gap Nature Reserve and Goulburn River National Park. Moderate condition (i.e., riparian vegetation although fragmented across the landscape).	The vegetated riparian parts of the Stage 2 area are considered to be of high importance to foraging populations of the Eastern Bentwing Bat as these areas promote increased insect activity. Potential roost sites are located outside the Stage 2 area within the Goulburn River National Park. Other large areas of intact native vegetation such as the Munghorn Gap Nature Reserve also represent potential foraging and roost areas, with the site being an important connection between the Munghorn Gap and Goulburn River conservation areas.

[1] Vegetation cover and type is based on the Mitchell Landscape classification system used by the DECC and includes consideration or geology, geomorphology, topography, soils and geodiversity.

Clarification on the Assessment of the Regent Honeyeater

Page 121 of EA Appendix 7 states that 'Given the presence of potential foraging and breeding habitat, it is considered that there is a moderate to high likelihood of this species being impacted from open cut mining operations'. In contrast, page 156 of EA Appendix 7 states that 'No known habitat is expected to be impacted by Stage 2'.

In the context of the Stage 2 ecological impact assessment, use of the term 'known' is used synonymously with 'confirmed species occurrence or observation'. For all species considered in the Stage 2 ecological impact assessment, species presence was determined from historical records and baseline surveys, including targeted species surveys.

Regent Honeyeater has been recorded in the Munghorn Gap Nature Reserve 4 km to the south of the Stage 2 area, in the Cumbo Creek area 10 km to the east of the Stage 2 Project Area and in the Capertee Valley about 70 km to the southeast of the Stage 2 Project Area (EA Appendix 7 page 121 and 156). However, there are no records or observations of the Regent Honeyeater within the Stage 2 Project Area (EA Appendix 7 page 121). By implication, this also dismisses the presence of core breeding habitat for the Regent Honeyeater within the Stage 2 Project Area.

Notwithstanding, the assessment for the Regent Honeyeater identified the presence of 'potential' foraging and breeding habitat, such as woodlands including Yellow Box and White Box, in the Stage 2 Project Area. The potential occurrence of foraging and breeding habitat is also supported by the close proximity of the Stage 2 Project Area to known Regent Honeyeater foraging and breeding activity (i.e., Munghorn Gap Nature Reserve and Cumbo Creek).

Since the Regent Honeyeater is not known in the Stage 2 Project Area, it was concluded that potential foraging and breeding habitat within the Stage 2 Project Area is of comparatively lower value relative to areas of known core foraging and breeding habitat in the Munghorn Gap Nature Reserve and Cumbo Creek area. The reasons for the Regent Honeyeater's absence in the Stage 2 Project Area are not stated in the assessment and are not known. However, it is speculated that the capacity of the Stage 2 Project Area to support Regent Honeyeater foraging and breeding activity is limited (EA Appendix 7 page 121).

The removal of vegetation, particularly areas of potential habitat, has the potential to affect movement of the Regent Honeyeater between known core habitat in the Munghorn Gap Nature Reserve and Cumbo Creek area (to the south and east of Stage 2) with potential habitat (i.e., woodlands including Yellow Box and White Box) to the north and west of Stage 2, albeit temporarily. However, the loss of vegetation cover from the Stage 2 Project Area will not sever known core habitat areas. This interpretation supports the comment 'would not be greatly impacted' (EA Appendix 7 page 156).

In summary, the Stage 2 ecological impact assessment predicts a moderate to high likelihood for an impact on potential foraging and breeding habitat for the Regent Honeyeater within the Stage 2 Project Area (EA Appendix 7 page 121). Use of the term 'likelihood' relates to habitat as a generality and does not consider whether the species is present or not. Given the overlap between the impacts of Stage 2 and potential habitat, it was determined that there is a 'moderate to high likelihood' for an impact on this species (EA Appendix 7 page 121). The worst case scenario is for an impact on known habitat or core breeding habitat, although there is no evidence currently supporting this outcome (EA Appendix 7 page 156).

Identifying the possibility for an impact on core breeding habitat triggered the development of mitigation measures to minimise the effects of mining activities on this species. Recommended mitigation measures are varied and address the majority of relevant lifecycle elements, including requirements for movement corridors (EA Appendix 7 Section 10.4.2 and 10.5.1).

Clarification on the Assessment of the Spotted-tailed Quoll

Similar to the assessment for the Regent Honeyeater, there are no 'known' occurrences of Spotted-tailed Quoll within the Stage 2 Project Area and consequently no known habitat for this species. However, the Stage 2 Project Area is considered to contain potential habitat for the Spotted-tailed Quoll.

References made to 'direct' and 'indirect' impacts from mining on this species (EA Appendix 7 page 122) refer solely to impacts on potential habitat only. As with the assessment for the Regent Honeyeater, 'likelihood' of impact relates to habitat as a generality (i.e., applied equally to known and potential) and does not consider whether the species is present or not. Given the overlap between the impacts of Stage 2 and potential habitat, it was determined that there is a 'moderate to high likelihood' for an impact on this species (EA Appendix 7 page 122).

While not stated in the ecological impact assessment (EA Appendix 7), the worst case scenario is that Stage 2 will have an impact on known core habitat. The indicated contradiction between page 122 and page 158 (EA Appendix 7) can be clarified by stating that the Stage 2 Project Area does not contain known habitat for the Spotted-tailed Quoll.

The main predicted impact of Stage 2 on the Spotted-tailed Quoll is the effect of open cut mining on movement corridors (and any implied foraging areas). The ecological impact assessment (EA Appendix 7) assumes the Spotted-tailed Quoll occurs within the Munghorn Gap Nature Reserve and Goulburn River National Park. Stage 2 open cut mining will locally and temporarily reduce the extent of native vegetation, which could be used by this species to move between these conservation areas. The potential loss of local movement corridors will be mitigated through progressive rehabilitation of the mine disturbance area and through vegetation improvement works on degraded areas outside of the mine disturbance footprint (EA Section 5.7, 5 and 5.18).

2.5.11 Non-compliance of Stage 1 Project Approval Conditions

Issues

- Moolarben Coal Mines has not complied with the Project Approval conditions of Stage 1; they have built roads and fences and cleared trees that they said they would not touch.

Response

Clearing to construct a mine lease boundary fence was undertaken in accordance with the conditions of the Mining Lease under the *Mining Act 1992* and is part of the Stage 1 project.

Moolarben Coal Mines has proposed a raft of measures to offset the impact of all clearing associated with Stage 1, including the fence line. These offset measures will improve local biodiversity values in the long-term.

2.6 Subsidence

2.6.1 Subsidence Impacts on Landscape, Safety, Archaeology and Aquifers

Issues

- The DPI has noted that:
  - Two identified cliff lines (C8 and C9), which are situated on private property, will be the most impacted by subsidence, potentially causing rock falls affecting the general landscape and creating a public safety hazard.
  - A number of Aboriginal archaeological sites associated with rock formations may be impacted by subsidence.
  - Depth of cover in the order of 120 m or less may affect groundwater aquifers if they are present above the proposed underground workings.

Response

Surface subsidence as a result of longwall mining may potentially increase the risk of rock fall from rock outcrops in areas above UG1 and UG2. Moolarben Coal Mines will implement a range of monitoring, management and mitigation measures to minimise the risk of rock fall to public safety. This includes documenting the condition and stability of rock outcrops above UG1 and UG2 prior to mining, restricting access to publicly accessible areas and making areas on privately-owned land safe, where monitoring indicates rock outcrops are unstable (EA Section 5.8).

The most significant archaeological site above UG1 and UG2 is a rock shelter comprising Aboriginal artwork. Moolarben Coal Mines will protect this feature from surface subsidence effects by leaving a block of unmined coal beneath this site (EA Section 5.8 and Response to Submission Report – Part A Section 3.4.2). Moolarben Coal Mines will implement a suite of mitigation measures to address impacts on other archaeological and cultural sites above UG1 and UG2 (EA Section 5.8). These will be detailed further in the subsidence management plan for Stage 2.

As described in Sections 2.2.4 and 2.2.5, the Triassic-age sandstone units overlying UG1 and UG2 are dry and the Permian-age coal measures, including the Ulan Seam, are only partially saturated. As the rocks overlying the Stage 2 underground mining areas do not comprise significant aquifers, Stage 2 subsidence induced effects on aquifers will be minor. Stage 2 underground mining will not impact on the supply of groundwater from Triassic-age sandstone units at any location surrounding the MCP.

2.6.2 Destabilisation of Cliffs and Gorges

Issues

- Mine subsidence could trigger ground movements that will destabilise the sandstone cliffs and gorges.
- There is no discussion of the condition of the sandstone escarpment in relation to weathering, existing fractures, or density of overhangs.

Response

There are no gorges above or in the immediate vicinity of Stage 2 that could be impacted from surface subsidence effects or from far-field horizontal movement as a result of longwall mining in UG1 and UG2. The subsidence impact assessment identified ten cliff lines of between 10 and 20 m in height and up to 50 to 100 m in length, directly overlying UG1 and UG2. Longwall mining could cause rock falls on up to 30% of the combined total length of these cliffs (EA Section 5.8 and EA Appendix 8). As described in Section 2.6.1, MCM has committed to a number of measures to monitor, manage and mitigate the effects of longwall mining on these cliffs and to minimise any consequential damage.

The cliff lines above UG1 and UG2 generally comprise small (less than 10 m), off-vertical, discontinuous rock outcrops. It is not believed that weathering, fractures or density of overhangs will affect the predicted proportion of cliff lines that could experience rock fall as a result of longwall mining in UG1 and UG2 (EA Appendix 8).

2.6.3 Subsidence Impacts on Infrastructure and Traffic

Issues

- Mine subsidence (in the order of 2.4 m) will seriously damage the only access road to Goulburn River Stone Cottages, its underground telephone line and, with associated mine operations, constitutes a significant risk to guests arriving and leaving throughout the day and night.

Response

The access road and underground telephone line to the Goulburn River Stone Cottages are located above UG4 and are in excess of 5 km from the closest part of UG1 and UG2. The surface subsidence effects of UG4 were assessed in the Stage 1 EA (Wells Environmental Services, 2006b) and reviewed by an independent panel of experts appointed by the Minister, and have been approved. Stage 2 UG1 and UG2 will have no impact on the access road and underground telephone line to the Goulburn River Stone Cottages.

Operation of the MCP will increase traffic movements and this could have some adverse effect on all road users, including guests arriving and leaving the cottages. However, all drivers and road users are obliged to obey the road rules in accordance with the NSW *Roads Act 1993* and various road transport acts.

3. CORRECTIONS

In Section 3.4.4 of the Response to Submissions Report – Part A, it was reported that a Preferred Project Report will be prepared for Stage 2. This is not required. Since exhibiting the Stage 2 EA, MCM has made changes to the infrastructure layout of Stage 1 which has changed the manner in which Stage 2 will integrate with Stage 1. Consequently, MCM has updated its project description for Stage 2, which will be detailed in a separate report to the DoP.

In Section 3.4.6 of the Response to Submissions Report – Part A, it was reported that a planning workshop was held with participation from the local Aboriginal community, the DECC and others to develop an Aboriginal Heritage Plan for Stage 1. This is incorrect. No workshop was held. However, MCM did consult with the local Aboriginal community and the DECC during the preparation of the Aboriginal Heritage Plan for Stage 1.

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4. REFERENCES

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5. ABBREVIATIONS

A

ANZECC Australian and New Zealand Environment and Conservation Council

ARTC Australian Rail Track Corporation

CCC Community Consultative Committee

CEEC Critically Endangered Ecological Community

CMA Catchment Management Authority

CSIRO Commonwealth Scientific and Industrial Research Organisation (Commonwealth)

D

dB decibel

DECC Department of Environment and Climate Change (NSW)

DECCW Department of Environment, Climate Change and Water (NSW)

DEWHA Department of Environment, Water, Heritage and the Arts (Commonwealth)

DLWC Department of Land and Water Conservation

DoP Department of Planning (NSW)

DPI Department of Primary Industries (NSW), now part of Industry and Investment NSW

DWE Department of Water and Energy (NSW)

E

EA Environmental Assessment

ECRTN Environmental Criteria for Road Traffic Noise

EEC Endangered Ecological Community

EL Exploration Licence

EPA Environment Protection Authority (NSW)

EPBC Act Environment Protection and Biodiversity Conservation Act 1999

EPL Environment Protection Licence

G

GDE groundwater-dependent ecosystems

H

ha hectares

Hz hertz

I

INP Industrial Noise Policy

K

km kilometres

L

L_{eq} equivalent noise level

LGA Local Government Area

L_{max} maximum noise level

M

m metres

MCM Moolarben Coal Mines Pty Limited

MCP Moolarben Coal Project

ML mega litre or litres

MWRC Mid-Western Regional Council

N

NOW NSW Office of Water

NSW New South Wales

O

OC open cut

P

POEO Act Protection of the Environment Operations Act 1997

T

TSC Act Threatened Species Conservation Act 1995

U

UG underground

W

W Act Water Act 1912

WHO World Health Organisation

WM Act Water Management Act 2000

Appendix 1

References of Issues Raised by Submission

Submissions Received	**Reference of Issues Raised**
Government Agency	
Department of Environment of Climate Change	Part A 2.1.2, 2.1.5, 2.1.6, 2.1.8, 2.1.9, 2.3.8, 2.3.11, 2.1.10, 2.5.4, 2.5.9
Department of Water and Energy	2.2.10, 2.2.11, 2.3.5, 2.3.9, 2.3.10, 2.4.2, 2.4.5
Department of Primary Industries	Part A 2.6.1
Department of the Environment, Water and Heritage	2.5.5, 2.5.9, 2.5.10
Hunter-Rivers Catchment Management Authority	Part A 2.3.10, 2.3.11, 2.5.1, 2.5.2, 2.5.3, 2.5.6, 2.5.7, 2.5.9
Mid-Western Regional Council	Part A 2.1.6, 2.2.4, 2.3.5, 2.3.9, 2.4.1, 2.4.2, 2.5.1, 2.5.6
Roads and Traffic Authority	Part A
Corporate	
Xstrata Coal	Part A 2.1.6, 2.2.6, 2.3.11, 2.3.12
Individuals	
Adler, N.	Part A 2.3.1, 2.3.2
Albury, A.	Part A 2.3.1, 2.3.2, 2.3.3, 2.5.7

Submissions Received	Reference of Issues Raised
Ambler, S.	Part A 2.3.1, 2.5.1, 2.5.2, 2.5.6
Anderson, M	Part A 2.1.1, 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Arnott, W. and Pavich, C.	Part A 2.1.3, 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2
Atkinson, B.	Part A
Barlow, C.	Part A 2.1.3, 2.2.2, 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Barlow, D.	Part A
Batey, L.	Part A 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.7, 2.1.8, 2.1.10, 2.1.12, 2.1.13
Bick, G.	Part A
Binns, B.	Part A 2.1.3, 2.2.4, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2
Brasseur, E.	Part A 2.3.2, 2.5.1, 2.5.2
Cleary, M.	Part A 2.5.1
Day, S.	Part A
Dunphy, D.	Part A

Submissions Received	Reference of Issues Raised
Ealing, L.	Part A 2.3.1, 2.5.1
Ellis, J.	Part A
Gant, L.	Part A 2.5.1
Goonrey, T.	Part A 2.1.3, 2.2.4, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2
Haines, A.	Part A 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Handicott, F.	Part A 2.1.1
Harris, J.	Part A
Hefford, L.	Part A 2.5.1
Higgins, B. and M.	Part A 2.5.1
Hope, M.	2.3.1, 2.5.1
Hulme, J.	Part A 2.1.3, 2.2.4, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2
Imrie, J. and C.	Part A 2.1.1, 2.1.2, 2.1.13, 2.1.14, 2.2.1, 2.2.2, 2.2.3, 2.2.4, 2.2.8, 2.2.9, 2.2.10, 2.2.11, 2.3.2, 2.3.7, 2.3.10, 2.3.12, 2.4.2, 2.5.1, 2.5.2, 2.5.7, 2.6.3
Imrie, T.	Part A 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.9

Submissions Received	**Reference of Issues Raised**
Jan, B.	Part A 2.3.1, 2.3.5, 2.3.9
Jury, F.	Part A
Kingston, P.	Part A 2.5.1, 2.5.9
Lawson, J.	Part A 2.3.1, 2.5.1
Lewis, J.	Part A 2.1.3, 2.2.2, 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Lewis, S.	Part A 2.1.3, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Lloyd, R.	Part A 2.5.1
Luckhurst, F.	Part A 2.2.2, 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
MacLeod, M.	Part A 2.1.3, 2.2.4, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2
Madigan, R.	Part A
Mayberry, K.	Part A 2.2.4, 2.2.8, 2.3.5, 2.3.9
M^{c}Guire, T.	Part A
M^{c}Phee, J. and K.	Part A 2.2.4, 2.3.9, 2.5.1, 2.5.2, 2.3.5, 2.3.11

Submissions Received	Reference of Issues Raised
More, J.	Part B 2.3.2, 2.5.1
Munro, S.	Part A 2.1.3, 2.2.2, 2.2.4, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Mushalik, M.	Part A
Nutting, B.	2.3.2, 2.5.1
O'Connor, F.	Part A
O'Mara, D. and P.	Part A 2.2.5, 2.3.9, 2.4.4, 2.5.1, 2.5.2, 3.2.3
O'Neill, R. and S.	Part A 2.1.3, 2.2.4, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2
Pattulo, C. (on behalf of Cumbo Creek valley residents)	Part A
Peters, A.	Part A 2.3.1
Rayner, D.	Part A
Rose, P.	Part A
Ryan, C.	Part A
Schofield, N.	Part A 2.3.2, 2.5.1

Submissions Received	Reference of Issues Raised
Sedgwick, P.	Part A
Sellers, C.	Part A
Setchell, P.	Part A 2.2.4, 2.3.5, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Stanford, R.	Part B 2.5.1
Stone, K.	Part A 2.1.3, 2.2.4, 2.2.5, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7, 2.6.1
Swords, H and M.	Part A 2.1.4, 2.2.10, 2.3.2, 2.3.10, 2.5.1
Symons, S.	Part A 2.5.1, 2.5.2, 2.5.3
Thomson, B.	Part A 2.1.3, 2.2.4, 2.2.5, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.6.1
Tuck-Lee, G.	Part A 2.5.11
Tyler-Olsen, L.	Part A
Wales, W.	Part A 2.1.3, 2.2.4, 2.2.5, 2.5.1, 2.5.2, 2.5.6, 2.5.7, 2.3.5, 2.3.9
Walsh, R.	Part A 2.1.14
Walter, I.	Part A 2.1.3, 2.2.4, 2.2.5, 2.3.2, 2.3.5, 2.3.9, 2.5.1, 2.5.2

Submissions Received	**Reference of Issues Raised**
Watson, K. and S.	2.5.1
Whalley, B.	2.3.1, 2.3.4, 2.6.2
White, W.	Part A 2.1.3, 2.2.2, 2.2.4, 2.2.5, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Wiggins, S.	Part A 2.3.2, 2.5.1
Woodhead, A. and L.	Part A 2.1.11, 2.3.1
Wright, C. and Mobbs, P.	Part A 2.2.4, 2.2.5, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Special Interest Groups	
Bathurst Community Climate Action Network Inc.	Part A 2.1.3, 2.2.4, 2.2.5, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Central West Environment Council	Part A 2.1.1, 2.1.3, 2.1.8, 2.2.6, 2.3.6, 2.4.3, 2.5.1, 2.5.8, 2.5.9
The Greens NSW	Part A 2.2.2, 2.2.4, 2.2.5, 2.3.5, 2.3.9, 2.5.1, 2.5.2, 2.5.7
Hunter Environment Lobby Inc.	Part A 2.2.7, 2.3.1, 2.3.5, 2.3.6, 2.3.8, 2.3.10, 2.4.3, 2.5.1, 2.5.2, 2.5.4, 2.5.5, 2.5.6, 2.5.7, 2.5.8
Johnsons Creek Conservation Committee Inc.	Part A 2.1.1, 2.1.3, 2.2.2, 2.2.4, 2.2.6, 2.3.1, 2.3.5, 2.3.6, 2.3.9, 2.5.1, 2.5.2, 2.5.6, 2.5.7
Joint Climate Action Groups	Part A 2.5.1, 2.5.2, 2.5.6, 2.5.7

Submissions Received	Reference of Issues Raised
Mudgee District Environment Group	Part A 2.1.1, 2.1.3, 2.1.9, 2.1.10, 2.2.2, 2.2.3, 2.2.6, 2.2.7, 2.2.8, 2.2.9, 2.3.1, 2.3.5, 2.3.6, 2.3.7, 2.3.9, 2.3.10, 2.3.11, 2.4.1, 2.4.4, 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5, 2.5.6, 2.5.7, 2.5.8, 2.5.9, 2.6.1, 2.6.2
Minewatch NSW Inc.	Part A 2.1.2, 2.1.3, 2.1.5, 2.3.13, 2.5.3, 2.5.7
National Parks Association of NSW	Part A 2.2.2, 2.5.1, 2.5.2, 2.5.4, 2.5.6, 2.5.7, 2.5.8, 2.5.9
Nature Conservation Council of NSW	Part A 2.1.3, 2.2.5, 2.2.8, 2.3.1, 2.4.4, 2.5.1, 2.5.2, 2.5.7, 2.5.8, 2.6.2
Orange Field Naturalist and Conservation Society Inc.	Part A 2.3.10, 2.5.1, 2.5.2, 2.5.4, 2.5.7
Orange Climate Change Action Now	Part A
Rivers SOS	2.2.2, 2.2.5, 2.2.8, 2.2.9, 2.3.2, 2.3.6, 2.3.9, 2.3.10, 2.4.4, 2.5.1, 2.5.7
The Wilderness Society	Part A 2.5.1, 2.5.2, 2.5.3, 2.5.8, 2.5.9

Appendix 2

Response to DECC Noise Impact Assessment Issues

24 July 2009

Ref: 07289/3188

Mr Michael Moore
Coffey Natural Systems Pty Ltd
Level 1, 3 Rider Boulevarde
Rhodes NSW 2138

RESPONSE TO DECC COMMENTS ON MCP STAGE 2 NIA

Dear Sir,

This letter provides a response to issues raised by DECC in their review of the MCP Stage 2 acoustic assessment. Each issue is reproduced below with DECC recommendations in italics. The responses presented below address the DECC recommendations.

Issue 1:

The EA does not present the frequency of occurrence of winds of less than three metres per second for each of the day, evening and night assessment periods in each season. This is important because the Noise Impact Assessment refers to southeast winds coinciding with mild temperature inversions at the Raynor weather station. No wind component was included with inversion condition modelling, however, which the Department is concerned will lead to an underprediction of noise impacts at residences to the northwest of Raynor, in the direction of Ulan village and Ridge Road.

The Department recommends that a 2 m/s drainage flow wind from the south east be included with inversion condition modelling to account for cold air drainage following Moolarben and other creeks.

Response 1:

The analysis of wind directions did not separate the day, evening and night periods as noted in DECC's response. Winds usually occur more frequently during one or more of the periods, however, an assessable wind is usually not a feature at all times. The NIA considers the worst case that assessable winds occur at all times.

The SE drainage flow identified at Raynor under F-Class stability conditions (mild inversions) is relevant to Open Cut 3 (O/C3) and possibly O/C2 which are close to Raynor. O/C 1 is nearest to Ulan village (which is approximately 7km north of Raynor) and the drainage wind at that site was found by Holmes Air Sciences to be from the NE.

Since the NE wind is noise *reducing* at Ulan village (with regards to O/C1 activities) it was not modelled with the inversion, to allow the inversion to achieve maximum predicted levels in the village. The SE drainage wind is not a feature of the topography near Ulan village so it was not modelled for O/C1.

With regards to the influence of a SE drainage wind on noise emissions from O/C2 and O/C3, this wind is also noise reducing at receivers near Raynor (ie, closest to the mine) and was not modelled so that the inversion by itself could represent the maximum impact at these receivers. What was modelled, however, was a 3 m/s gradient wind (which does not occur during inversions) from the ENE. This is almost directly from all open cuts to receivers west of the mine (ie, west of Ulan village, Ridge Road and near Raynor) and represents a worst case for noise impacts at all receivers.

Further, all receivers in the Ridge Road area are at a higher elevation than O/C2 and O/C3 noise sources, or there are intervening hills, so inclusion of a drainage wind under inversion conditions is not required under the INP.

Issue 2:

The $L_{Aeq(15min)}$ sound power levels, at least for dozers, haul trucks and the washery (which the Department considers to be major sources in terms of potential noise impact) are noticeably lower compared with those used in the Wilpinjong Coal Mine EA. Noise levels of up to 44 dB(A) $L_{Aeq(15min)}$ as a result of noise from Wilpinjong coal mine, have recently been measured in an audit conducted for the DoP, at a location for which a level of 36 dB(A) under adverse meteorological conditions was predicted in the Wilpinjong EA. The Department is concerned that noise predictions in the Moolarben EA might *significantly underestimate noise levels* likely to be experienced, given that the activities generating the noise (coal mining) are the same, and the physical attributes and the meteorology of the two sites (Wilpinjong and Moolarben) are the same (even having adjacent boundaries).

The Department recommends that sound power levels be validated through the determination of the sound power levels based on the same machinery to be utilised on site which is operated in the manner and has had the attenuation fitted as described in the NIA.

Response 2:

As explained in the NIA, noise data presented for, say, dump trucks are calculated 15-minute levels for each 350m section of haul road based on maximum pass-by levels when loaded/empty, the duration of each truck within the 350m section and the number of trucks per 15-minute period. The resulting values, which are typically 4-7 dB below the 'raw' measured values, can then be placed in the noise model to predict 15-minute noise emission values. It is common amongst many other acoustic consultants to run models based on the higher 'raw' values and then subtract a nominal value (often 7 dB) from the predicted levels to arrive at estimated 15-minute levels for comparison with the criteria. It is likely that this different presentation of data is what has given rise to DECC's concern.

Where possible, all values used in the NIA are calculated 15-minute levels based on actual measurements of machinery in operation at other sites, including measurement of the Whitehaven and Ashton washeries. The main exception is the haul trucks, whose grid-box and additional muffler attenuation were estimated and subtracted from measurements of an unattenuated truck.

Issue 3:

The NIA does not consider modifying factor adjustments, as detailed in Chapter 4 of the NSW governments Industrial Noise Policy, in particular the application of a 5 dB penalty for low frequency characteristics. A recent audit conducted for the Department of Planning in relation to noise from

Wilpinjong Coal Mine found that a 5dB modifying factor for low frequency content was applicable to measured levels.

The Department recommends the noise prediction model output be evaluated for the difference between C- and A-weighted levels at receiver locations and where this exceeds 15dB a 5dB penalty is added to the predicted a-weighted level, before comparison with the relevant criteria, in accordance with the Industrial Noise Policy (INP).

Response 3:

The recommended analysis has been carried out for several representative scenarios and potentially impacted receivers from 1.4km to >3km from the mine. **Table 1** shows direct Year 2 ENM model output, in octave bands, comparing C- and A-weighted levels at the five MCP Stage 1 construction noise monitoring locations:

TABLE 1

ENM predicted A- and C-weighted noise levels – MCP Year 2

R160 – ULAN PUBLIC SCHOOL									
	Sum	31.5	63	125	250	500	1k	2k	4k
dB(A)	34.0	5.8	15	20.2	28.1	30.7	27.4	12.7	-30.4
dB(C)	45.9	42.2	40.4	36.1	36.7	33.9	27.4	11.3	-32.2
C-A	11.9								
R26 – ROBERTSON									
	Sum	31.5	63	125	250	500	1k	2k	4k
dB(A)	36.6	1.7	13	24.1	27.8	34.1	30.4	14.3	-30.6
dB(C)	45.3	38.1	38.4	40	36.4	37.3	30.4	12.9	-32.4
C-A	8.7								
R169 – PRIMO PARK									
	Sum	31.5	63	125	250	500	1k	2k	4k
dB(A)	36.6	3	16.8	25.5	29.4	34.1	28.5	9.8	-50.8
dB(C)	47.1	39.4	42.2	41.4	38	37.3	28.5	8.4	-52.6
C-A	10.5								
R22 – AITON									
	Sum	31.5	63	125	250	500	1k	2k	4k
dB(A)	33.0	-6.2	13.6	22.3	28.5	29.3	23.9	-1.6	-71.7
dB(C)	43.6	30.2	39	38.2	37.1	32.5	23.9	-3	-73.5
C-A	10.6								
R170 – ROBERTS									
	Sum	31.5	63	125	250	500	1k	2k	4k
dB(A)	33.0	-6.2	13.6	22.3	28.5	29.3	23.9	-1.6	-71.7
dB(C)	43.6	30.2	39	38.2	37.1	32.5	23.9	-3	-73.5
C-A	10.6								

The above results are typical and show C-A levels <15dB, indicating that the 5dB low-frequency modifying factor is not applicable.

Issue 4:

The EA states that mild temperature inversions occur more than 30% of the time in winter, but does not specify by how much more. Appendix A of the Air Quality Impact Assessment (frequency of occurrence of stability classes) does not provide the frequency of F stability class occurrence on winter nights. F class stability includes lapse [sic] rates to 4degrees C per 100m and the noise impact assessment notes that G stability class inversions do occur.

The Department recommends 4 degrees C per 100m be used in the inversion condition modelling. This would be consistent with other recent noise impact assessments for coal mines.

Response 4:

Re-analysis of stability class data for the winter months (June-August) by PEAHolmes has revealed a 46.4% occurrence of F class conditions during the combined evening/night period. Advice from PEAHolmes is that G class conditions are included with the results for F class, and the software does not allow the two classes to be separated. G class conditions were described as "less frequent that is often thought", however, and are estimated to constitute less than 10% of the combined F and G class data. The relative break-up may be reasonably estimated as 42% F class and 4% G class, implying that F class conditions are assessable while G class conditions are not.

DECC is correct that the upper limit of the range of likely inversion strengths under F class conditions is quoted as 4^0C/100m, however Table E8 of the INP sets the default inversion strength at 3^0C/100m for F class stability conditions (plus a drainage wind up to 2 m/s, *if applicable*). Accordingly, the appropriate inversion strength of 3^0C/100m was included in the noise modelling. In order to directly address the DECC recommendation, however, re-modelling with a 4^0C/100m inversion has been conducted for the Year 2 scenario. Results are presented in **Table 2**, which also includes the original results for a 3^0C/100m inversion and 3 m/s wind from the ENE.

TABLE 2

ENM predicted operational noise levels dB(A),$L_{eq(15minute)}$ – MCP Year 2

Receiver	Description	Meteorological condition			Criterion
		Inversion (3^0)	Inversion (4^0)	ENE Wind	
162	Ulan Pub/Hotel	36	38	36	65
168	Anglican Church	35	37	36	45
160A	Ulan Public School	35	36	36	45
151	Catholic Church	37	38	37	45
158	Carlisle	36	38	38	38
46A	Flannery Centre	35	36	38	38
25	Tuck-Lee	34	35	36	38
26	Robinson	35	35	37	38
49	Brooks	35	35	37	38
169	Tinker	32	34	35	37
173	Richter	33	34	34	37
9	I.C.I. Australia Operations	37	38	38	65
22	Aiton	34	35	35	37
23	Woodhead	33	34	34	37
41A	Libertis	33	34	34	37
63	Whiticker	31	32	32	37
64	Goninan & Boland	31	32	32	37

Receiver	Description	Meteorological condition			Criterion
		Inversion (3^0)	Inversion (4^0)	ENE Wind	
70	Coventry	30	31	31	37
172	Kimber	30	31	31	37
170	Roberts	25	25	29	37
58	Bevege	30	31	30	35
59	Szymkarcuk	26	27	28	35
61	Miller	25	25	25	35
60	Rayner	25	25	25	35
37	Szymkarczuk	21	23	23	35
40	Devenish	23	24	23	35
41B	Libertis	23	24	23	35
106	Reid	22	23	22	35
171	McGregor	<20	<20	<20	35

The results in Table 2 show a minor (2dB or less) noise level increase due to the 4^0/100m inversion compared with the 3^0C/100m inversion. Predicted levels remain under the criteria at residences along Ulan-Mudgee Road and in the Ridge Road area.

Issue 5:

The NIA does specify the terrain type as rural and does detail the ground type modelled; however, it does not appear to allow for extended drought conditions when pasture coverage on open country is likely to be very low.

The Department recommends that a ground type, other than 4 (grass), consistent with less sound absorption and more reflection, be used in the modelling.

Response 5:

It is well established, and has been verified by the writer in the course of his PhD studies on outdoor sound propagation, that dry ground is more acoustically absorbent than grass-covered moist ground. It may seem intuitive that the vegetative cover is the main acoustic element but grass actually plays little role in sound absorption. Rather, it is the porosity ('flow resistivity' is the commonly quoted parameter) of the ground surface that has the greatest influence on sound. Previous measurements conducted by Spectrum Acoustics on dry pasture land has found that it absorbed sound significantly more than ENM 'grass' even though it was virtually cleared of all vegetation at the time.

Another study conducted by C. Wassillief in New Zealand and presented at the InterNoise conference in 1998 actually found that a grazed paddock had similar acoustic properties to ENM 'sugar snow' (one of the most porous of ENM's ground types). ENM 'grass' was defined from measurements of a manicured British airfield in the 1960's (flow resistivity values published in 1980) and is likely to underestimate, not overestimate, the amount of ground absorption likely to occur under the conditions nominated by DECC. The NIA therefore presents a conservative assessment of ground absorption effects.

Issue 6:

The noise prediction model used, ENM, does not automatically include noise contributions from reflections. There are significant areas of exposed sandstone outcrops, in elevated ("amphitheatre-like") terrain in which the project is located, that

The department recommends that areas of exposed sandstone in elevated terrain be used in the modelling as sources of reflected noise.

Response 6:

The rock escarpments were considered by Spectrum Acoustics' prior to commencement of modelling, as they could not automatically be ruled out as a potential contributor to elevated noise levels. The term 'ampitheatre' did not feature strongly in those considerations, however, as an amphitheatre is a highly engineered acoustic space that is quite difficult to achieve and requires conditions not present along the Munghorn Gap Nature Reserve escarpment. Specifically, the escarpment is at higher altitudes than the mine, is non-continuous comprising small (<10 m high) off-vertical rock outcrops, and at no point does it 'overhang' significantly enough that noise coming up to it from ground level could reflect back towards ground level or even horizontally. There may be some diffuse reflections, such as scattering from trees and individual rocks, that could re-enter the sound field near ground level, but the physical nature of the site is such that any influence of the elevated escarpment on noise emissions from the mine would be very minor. Adding these minor sources, if it could even be done realistically in ENM, would not increase noise levels over those presented in the NIA by a measurable or audible amount.

Issue 7:

The road traffic noise assessment does not provide the existing level of road traffic noise, for comparison against the criteria in the Department's guideline *Environmental Criteria for Road Traffic Noise* (ECRTN).

The Department recommends that an assessment of the existing road traffic noise is undertaken.

Response 7:

Criteria in the ECRTN are absolute except for those cases where existing traffic noise levels equal or exceed the criteria. Only then do the traffic noise criteria for a given project become relative to ambient traffic noise levels. It was established early in the EA process that only small numbers of non-mine traffic passed through Ulan village and that ambient levels would be well below the ECRTN criteria. Monitoring of existing traffic noise levels was, and still is, considered unnecessary for the setting of traffic noise criteria for the MCP.

We trust this information will assist with the Department of Planning's consideration of the NIA. Please call our office on 4954 2276 if you require further information.

Yours faithfully,

SPECTRUM ACOUSTICS PTY LIMITED

Neil Pennington

Principal/Director