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Moolarben Coal Complex Stage 2 _ Preferred Project Report 08_135

I wish to lodge my objection to the Moolarben Coal Complex (MCC) Stage 2 Preferred Project Report (PPR). This proposal falls well short of the environmental requirements that would be necessary to offset and mitigate the prospective water catchment degradation and biodiversity loss emanating from this mine. It fails to provide adequate compensation to the local community and future generations for the scale and impact of the project predicted to endure in excess of 100 years.

I would like to request the Department of Planning appoints an independent expert panel or Planning Assessment Commission (PAC) to fully scrutinise the strategies, assumptions and actions outlined in the MCC PPR.

Due to time constraints and the complex issues involved this response is only a summary of outstanding issues followed by a brief analysis of water and biodiversity impacts and mining offsets.

- The MCC PPR offset package should include the transfer of the culturally and scenically significant river corridor known as The Drip and Corner Gorges into the Goulburn River National Park, securing the sites long term protection, public access and appropriate management.
- Permanent damage to the Goulburn River and connected groundwater system in excess of 100 years is unacceptable (no social license)
- No confidence that the groundwater modelling reliably predicts water impacts - there are significant disparities in the groundwater modelling in MCC and Ulan Coal Mine groundwater assessments
- MCC predicts a water deficit where demand exceeds water supply 23 out 24 years. The predicted shortfall (up to 6.57ML/day – 1990ML/annum) should not be sourced from already overextracted groundwater sources.
- MCC hierarchy of water sources should clearly prioritise UCML surplus water for priority use and avoid any extraction from the Northern Borefield

- There is no clear commitment (or water allocation) by MCC to offset reduced catchment runoff into western end of the Goulburn River or replace loss of baseflow.
- With MCC water demand of 10.55ML/day the cumulative water demand from mines in the Ulan Wollar area is ~ 22% (>30ML/d or 11GL/a) of the allocation for the whole Goulburn River Extraction Unit (50GL/a)
- Biodiversity offsets are located outside the bioregion and catchment, do not represent "like for like' nor adequately compensate, maintain or improve loss of habitat, amenity or connectivity of a key east west wildlife corridor.
- Project specific night-time noise criteria (35db + other mines) will have a detrimental affect on residents and our ecotourism business Goulburn River Stone Cottages (concerns regarding noise from conveyor positioned on ridge/not sound attenuated)
- Production 17Mt coal or 23.7 Million tonnes (co_2^{-e}) year of Greenhouse Gases would fuel further climate instability and intergenerational inequities.

1. WATER

The Moolarben Coal Project (MCP) Groundwater Impact Assessment (GIA) makes a series of fundamental errors in their assumptions and modeled predictions for the impact of this mining complex on the water systems of the Goulburn River. It underplays the critical importance and fundamental role of ground and surface water interaction that drives this water system and ensures its resilience and integrity throughout drier periods. MCP GIA groundwater modelling simulating water impacts and recovery predictions for a 100 year period are inconsistent with Mackie Environmental Research (MER) monitoring and model predictions for UCML Continued Operations (2009 & 2011)

Critical issues have been identified in the way models are calibrated and how their reliability is demonstrated. Models reflect the proponent's viewpoint and are only as reliable as the assumptions on which they are built, which in turn may predetermine the outcome. MODFLOW is a numerical model based on conceptual assumptions that has critical limitations, especially in the simulation of surface water–groundwater interactions where the vertical flow component is significant (Brownbill et. al. 2011). Groundwater models by their very nature are a simplified version of complex groundwater surface water interactions of which we have limited understanding. A model calibrated in the absence of observations of a particular physical process (e.g. stream–aquifer interaction or base flow) cannot be regarded as reliable without verification against that process. Accurately predicting outcomes even a few years in advance are problematic, 100 years virtually impossible. Models are not reality but a tool used to test possible scenarios and require verification and constant revision. Large claims such as those presented in the MCC GIA need to be supported by compelling evidence.

A. Triassic Aquifer Connectivity with River system

The simplistic labeling of the Triassic layer as “perched’[1]and therefore unaffected by mine subsidence and depressurisation of the underlying groundwater system is a flawed assumption with little scientific rigor. Extensive vertical jointing and fracturing (a feature of the ‘cliff forming’ Triassic Narrabeen Group geology) provides the mechanism whereby flow pathways (water conduits) increase vertical groundwater flow[2] - potentially ‘connecting’ the Triassic and Permian layers. Hydro-chemical analysis plus the response of hydraulic heads would indicate that the Triassic and Permian aquifers are connected and recharged from surface water infiltration (meteoric)[3] with groundwater flow generally towards the north east into local creeks and the Goulburn River contributing baseflow along ‘gaining’ reaches of the river. If however they are significantly ‘depressurised’ (lowered) - like pulling a plug - the water levels drop, and flows can be reversed[4], the creek or river is now “losing’ stream flow.

Increased vertical hydraulic permeability due to mine subsidence occurred above UCML underground prior to 2006 and the installation of the wider long wall faces. Table 5.9 (p.48 MCP GIA) shows increasing mine inflows from the 1990s, accelerating in 2000-2002 wet years (from 5.6- 7.7 ML/day). Triassic Bore PZ129 has a hydraulic head range 390-393mAHD (MCC AEMR 2010-11) this is above the level of the river (~382m AHD) indicating groundwater flows towards the River (see Fig2.5).

There is also similarity in the hydraulic heads of the upper Permian and lower Triassic aquifers in the northern end of MCP UG4 (p. 13 MCP GIA). Interestingly in the 2010-2011 Moolarben AEMR water levels in Triassic monitoring bore PZ103c “dropped as a result of the pumps tests (*Permian aquifer*) in the Northern Borefield” (398.25m-397.24m).

B. Modelling Assumptions

In assessing the cumulative impacts of mining MCC GIA ignores vital hydro-geological evidence from the area. It has preset the modelling on a series of flawed assumptions that predetermine the predicted outcomes and downplay the many uncertainties and possible impacts to baseflows and GDEs along the Goulburn River. The model assumes:

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1 Fig 5.2b MCC PPR Vol 2. App E GIA
2 Jasonsmith, J (2010) Origins of Salinity and Salinisation processes in the Wybong Creek Catchment, NSW PhD Thesis, Fenner School ANU
3 White et al. 2009.
4 Kalbus 2006, p. 78 Pells 2011

- subsidence cracking does not extend into the Triassic aquifers above UG4 - unlike the increased vertical permeability above UCML longwalls (p.40 MCP GIA)
- regionally significant Triassic aquifers are 'minor' above UG4 in the vicinity of the Goulburn River
- the presence of impermeable "aquitards" in layers 4-6 (Table 5.1 p.38 GIA) confines the upper aquifers
- unproven estimates of baseflow to local creeks and rivers (Table 5.12 p.55)

Uncertainty analysis modelling predicting mine inflows for increased vertical hydraulic conductivities in the upper layers (Triassic) are examined for UG1 & UG2, but not for UG4 (Fig. 5.5). The assumption by MCP GIA that the Triassic aquifer system will not be breached above UG4 was based on the MCP Stage 1 EAR subsidence report:

"The likelihood of a direct connection with the surface is assessed as highly unlikely to practically impossible for areas where the depth (overburden) exceeds 100m" p.54. [5]

Combined with the questionable supposition;

"since the beginning of 2006, localised large drawdown impacts have been observed in the lower Triassic, coinciding with the introduction at Ulan Coal Mine of 400m wide longwall panels (longwall panels were previously 208m in width)." MCC App E p.*57*

The Moolarben GIA ignores the general paucity of relevant Triassic groundwater data (especially prior to 2006) and evidence from increasing mine inflows prior to 2006. It is also inconsistent with UCML report (Mackie Environmental Research - MER). UCML latest subsidence report (SCT North 1 - 2011) [6] for deeper longwall panel's of similar width:

"The Overburden strata is expected to be fractured from seam level through to the surface ….increased fracture intensity is expected to increase vertical hydraulic conductivity throughout the overburden section. Groundwater within the overburden strata is expected to be depressurised as are result of increased hydraulic conductivity."

The Moolarben UG4 coal seam is both significantly shallower (OB: 85-170m) with a thicker seam extraction (4.5m) than all of UCML longwalls (OB: 110-265m). Curiously in the current MCP Subsidence Impact Assessment for UG 1 & UG2 (seam extraction width only 2.1 & 3.1 m):

'It is expected that the height of the fractured zone above the proposed long walls will extend up from the Ulan seam to the surface",

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[5] Moolarben Coal Project EAR VOL 4 App 8 Subsidence Impact Assessment 2006 - Strata Engineering -
[6] UCML 2011 SCT Operations – App 2A. Subsidence Assessment for North 1 UG Panels 2010. Overburden depth = 115-195m p.10 "Surface cracking and increased vertical conductivity within the overburden strata are expected to reduce the capacity of watercourses to support surface flow after rainfall events"

The many inconsistencies between MCP GIA modelling, UCML's (and even MCCs own reports) draws into question the veracity and reliability of the predicted impacts during mining let alone 100 years hence. It is difficult to have any confidence that the modelling predictions of MCC GIA can be relied upon or indeed believe that the mine has a social license to degrade for over 1oo years this valuable freshwater river system.

C. Water Demand and Deficit

The mine is within the catchment of the Goulburn Extraction Management Unit (GEMU) of which 50GL/annum is licensed for extraction[7]. There is no trading permitted out of the water source only downstream within the source. The cumulative demand of the three operating mines that sit at the top of the catchment will be in excess of 10 GL/annum or over 20% of total GREU and involve extensive aquifer degradation and interference. It is recognised that the Upper Goulburn River has limited surface flows and is a groundwater dominated system. Sustained aquifer drawdown can significantly alter and impair microbial function and water quality in groundwater systems (Tomlinson 2011)

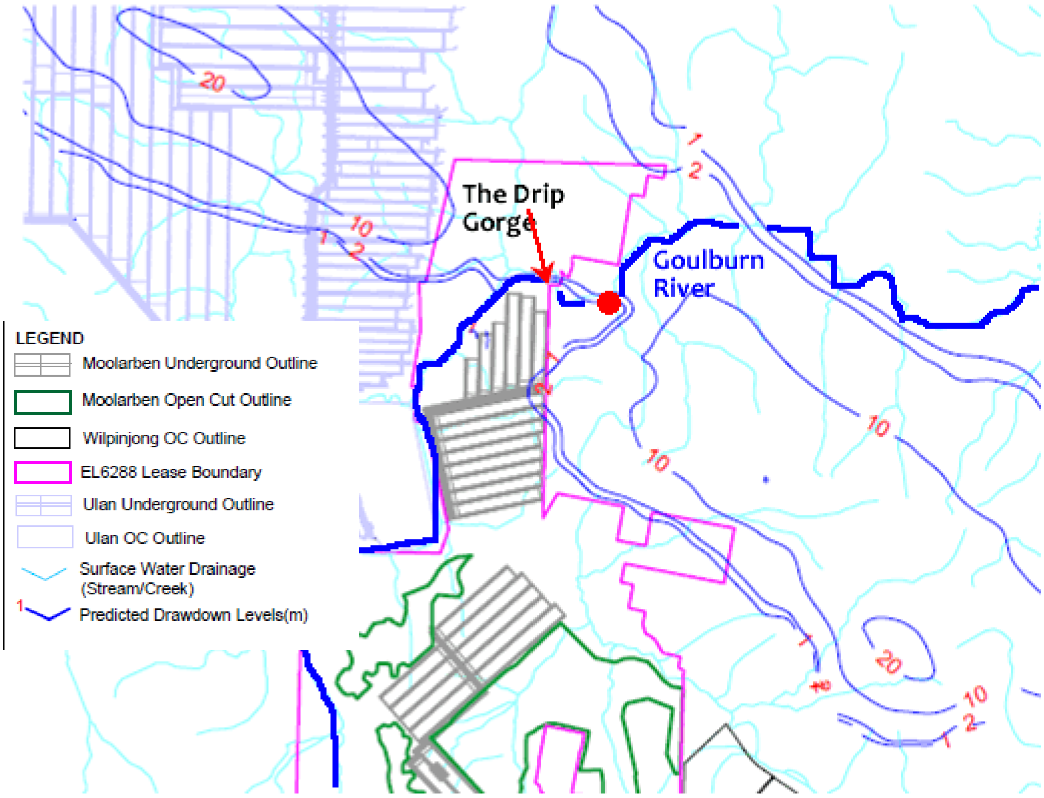
Based on available water sources MCC is predicted to have a water deficit of 23 years out of 24 with a peak demand of 3852ML/year. MCC revised maximum water demand for dust suppression of 2.2ML/day (783ML/year) is an extrapolation of the 1.1ML/day used in 2010 (Stage 1) for washing 4MT/yr. If opencut coal production is increased to 13MT/year (ie 3 x 2010 levels) 2.2ML/day for dust suppression appears inadequate. It is also inconsistent with UCMLs requirements for dust suppression of 1978ML/year (based on 2007/2008 UCML 2009 App. 7 Fig 2.1). This highlights the need for a closer scrutiny of the overall water demand considering the immense cumulative mining disturbance footprint, the critical need to suppress dust pollution and the considerable volume of water involved.

In order to cover the mines water shortfall MCC GIA assumes a potential extraction rate from the northern borefield of up to 2400 ML/a (ie 6.57 ML/d p.47). This degree of groundwater extraction would create a significant drawdown (depressurisation) or cone of influence that MCC claim will have no consequences on the upper aquifers and the connected river system (or Imrie private bore SP49). However it is evident from monitoring of water levels in PZ103c (Triassic - UG4) that pump tests on the underlying Permian aquifer can lower the Triassic aquifer (398.25-397.24 – 2010/11 AEMR p.120).

UCML excess water from their underground dewatering (see Table 5.9) should be used ***before*** any additional groundwater is extracted from this already stressed aquifer system. **This groundwater and river system is a public resource that should not be destroyed or given away as a subsidy to multinational corporations.**

[7] Hunter Unregulated and Alluvial WSP – Goulburn River Extraction Unit

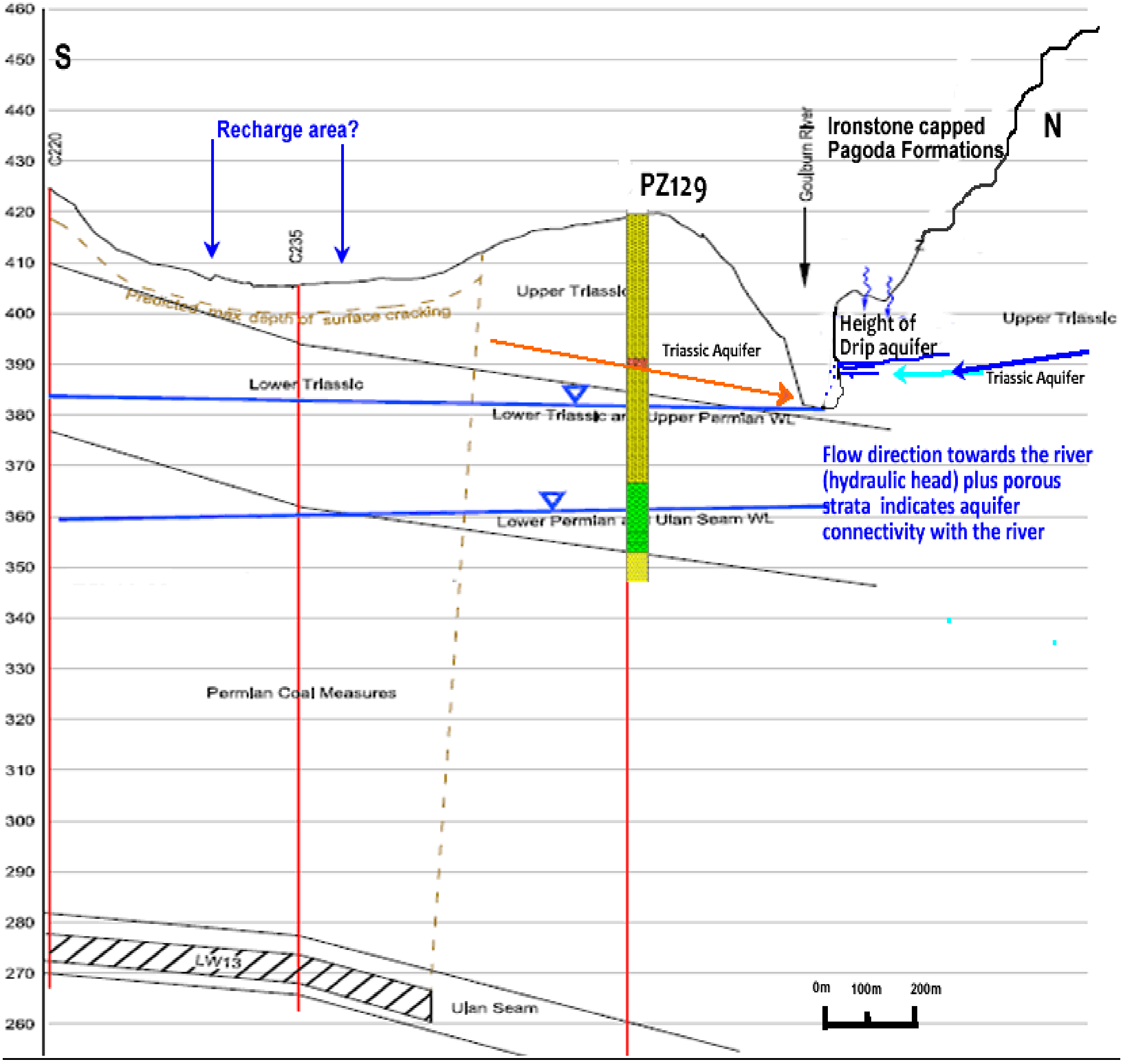
The contours modelled for cumulative potential drawdown in the **Upper Triassic-End of Mining 2042** (Fig 6.6b) indicates a 1-2 m lowering of the groundwater system straddling the river channel in the Drip area. This would potentially change the river from a 'gaining" to a 'losing' leaky river altering aquifer pressures supporting the Drip GDE and Imrie bore ● and intercepting baseflows to the river.



D. The Drip

The GDE referred to as 'The Drip' has not been adequately investigated or understood. Local knowledge will confirm that seepage is sustained throughout the severest of droughts; this resilience suggests it is fed by a permanent groundwater source located above the 'dripping' discharge area (~ 390 mAHD - halfway up the cliff face). While the aquifer would obviously rely on replenishment from rainfall events, it may also be sustained from upward pressure from joint or fault connecting it to the Triassic aquifer system (Pz129 = 389-392 mAHD) and therefore could be potentially drained if the Triassic Aquifer was depressurised. The water level in hydraulic head of Triassic Bore PZ 129c (opposite The Drip) indicates groundwater flow towards the river.

Fig 2.5 - MCC Transect 4 – with Drip seepage zone height corrected to 8-12m
PZ129 superimposed (depth to scale – from LOG)



F. Response Plan

The monitoring and reporting process in the updated Water Management Plan that triggers a response (e.g. cease to pump) should be transparent, accessible by community and etched into the approval conditions should water quality or connectivity between the river and groundwater sources be affected. The Contingency Response Plan parameters need to be closely scrutinised to ensure the 'triggers' (and subsequent management actions) are effective in avoiding permanent damage to the aquifer system **before it occurs** as groundwater lag time and seasonal variations can mask effects before it too late to reverse the damage.

The suggested trigger levels for a change in groundwater salinity of 50% are too high to ensure aquifer water quality discharging into the surface waters are protected. The PPR GIA recommends the groundwater monitoring data should be reviewed if observed groundwater level drawdowns are greater than 20% or more 'than predicted for any consecutive three month period' (p.66). There is an issue with the reliability of the predicted change in levels and waiting three months before the cause is investigated. Decrease in groundwater levels of more than 10 % or changes in the direction of critical groundwater flow (e.g. recharge/discharge reversal) need to be promptly identified and investigated.

Water quality guidelines need to be tailored to site specific baseline conditions not rely on ANZECC default values for "lowland" rivers. A number of trigger levels based on these general guidelines need rectifying (AEMR 2010-2011 Table 35. p.87). In addition there are numerous examples where collected data appears spurious requiring review - any anomalous results should be flagged, explained or removed from baseline range. For example PZ103c (Triassic level) is shown as having an EC range of 340-**13000**, while subsequent monitoring is consistently in the 320-385 range (p.128 AEMR 2010-11).

The proposed rainfall trigger of '30mm/day' for collecting surface water samples neglects rainfall events capable of significant sediment runoff. There has been an increase in river turbidity after even minor rainfall events since MCP begun operations. Increased clogging of the hyporheic zone by fine sediments can affect hydrological exchange and biogeochemical processes in streambed sediments, promote algae growth and affect the ecological health of the river system[8]. Sources of river turbidity need to be identified and addressed. This requires more frequent monitoring of point and diffuse discharge points including surface water runoff from areas being rehabilitated, and investigation of other possible sources. Monitoring needs to be triggered when rainfall exceeds 24 mm/day or 20mm/hour.

The outstanding Land & Environment court case between OEH (EPA) and MCP concerning multi pollution incidents (sediment discharge 2009/10) should be resolved before further approvals are considered.

2. BIODIVERSITY AND OFFSETS

The Stage 2 PPR mine disturbance footprint has significant impacts on remnant native vegetation, local and regional biodiversity (900 has of native vegetation including 123 has of Box Woodland EEC) plus removal of over 8 kms of creek frontage and 148 archaeological sites. The bulk of the offset area is located well outside this bioregion, is approximately 50-80 kms from the Hunter catchment, at a much higher elevation and contains very different vegetation communities e.g. peppermint forests and River Oak riparian forest rather than Rough-barked Apple *(Angophora floribunda)* riparian forest indigenous to

[8] Tomlinson (2011) Note: During extended droughts the riparian ecosystems along the Goulburn River are dependent on groundwater and therefore GDEs.

Murragamba Creek (see Plate 3 App.F) and along the walking track to the Drip, Goulburn River. The two proposed offset sites located south of Mudgee have no connectivity with the sub-bioregion or the critically important east-west corridor in the Ulan Wollar Turill area that links, at the lowest point of the Great Dividing Range, coastal forests and woodlands to those of the Brigalow belt and western slopes. This threatens the ‘resilience” of the area; any offsets should connect and add to the remaining forests and woodlands.

Most significantly the MCC PPR offset package does not include the regionally and culturally significant ‘Drip and Corner Gorges’; a riparian corridor and Groundwater Dependent Ecosystem (GDE) located on the Goulburn River between the Ulan Road and Goulburn River National Park and immediately to the north of the Moolarben Coal Mine. The Drip and Corner Gorge are recognised as high conservation, highly valued by the public and used extensively for recreational and educational purposes. The Drip Gorge was recently promoted as one of the “Top 10 Green Travel Tips’ by the Mudgee Tourism office. Both the ancient sandstone corridor and adjacent escarpment have an extensive aboriginal heritage with the National Trust listed ‘Hands on Rock’ just up the road and The Drip and Corner Gorges currently being assessed for inclusion by the Trust’s landscape committee. This riparian corridor vegetation and GDE is closely representative and connected to the area to be impacted by mining.

Any offset package for this project must recognise the importance of transferring the Drip block (Lot 45/DP750750) and river corridor including the Corner gorge (northern section 30/DP755439) into the Goulburn River National Park to secure the long term protection, appropriate management and on going public access to this high value conservation area.

Yours faithfully,

Julia Imrie

Julia Imrie BSc. Grad Dip Water Resource Man.

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