Submission No 35

INQUIRY INTO BENEFICIAL AND PRODUCTIVE POST-MINING LAND USE

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Beneficial and productive post-mining land use

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Coal mining companies must be held to account, both legally and financially for the final clean-up and rehabilitation of the highly modified mined landscape to ensure the delivery of environmental outcomes that are at the very least are equivalent to or better than the original approval commitments.

Options to allow some future industrial use post mining cannot be used to replace or compensate for the loss of biodiversity or the permanent degradation of our waterways.

Mine closure plans need to be able to deliver a healthy, sustainable and diverse environment well into the future. The final rehabilitated landform must be able to support productive land uses including opportunities for local employment while restoring the ecosystem services and biodiversity delivered by the pre-mined landscape.

This requires an integrated landscape restoration plan, genuine community consultation and a dedicated public authority to ensure mine closure plans are fully implemented and the required environmental outcomes are sustainable over the long term.

The mining industry must allocate sufficient funds to cover the land-managers, onsite workers, consultant ecologists and hydrologists required over many decades to restore natural ecosystems, control invasive species and feral animals and manage the risk of climate extremes - from soaring temperatures, to droughts and high intensity storm and flood events. Past coal mining approvals have failed to adequately cover the imperative for effective long-term management of these highly modified landscapes. Future generations and communities should not bear the cost of this mining legacy.

The loss of biodiversity and degradation of soil structure, soil water holding capacity and microbiota will require many decades before a resilient self-sustaining natural ecosystem is achieved. The interception and capture of catchment runoff and permanent distortion and lowering of groundwater levels will continue to intercept baseflow, alter stream flow and degrade water quality. The interaction of water with crushed rock overburden releases salts and other contaminates including heavy metals. These impacts are serious long-term risks that will need to be carefully managed post-mining.

Case Study – Coal Mining in the upper Goulburn River, Hunter Valley (Ulan Wollar)

Opencut and underground mining has inflicted irreversible damage to surface water flows and the groundwater system in mining regions. Groundwater modelling by Glencore's Ulan Coal Mine and Yancoal's Moolarben Coal Mine in the Ulan Wollar area has predicted the depressurised groundwater system will take hundreds of years to rebound[1]. Discrete aquifer layers have been lost with the long-term predicted residual drawdown forming high and low groundwater levels that differ from pre-mining that will continue to capture and divert surface and groundwater water flows. Research shows an increased risk that remaining mining voids or pit-lakes will shift from "terminal

[1] HydroSimulations, 2017. *Moolarben Coal Open Cut Optimisation Modification Groundwater Assessment: Appendix I*, Moolarben Coal Operations Pty Ltd., YANCOAL, Australia.
MER, 2015. *Appendix 3: Assessment of Groundwater Related Impacts arising from Modifications to the Ulan West Mine Plan.* , GLENCORE Ulan Coal Mines Ltd.,

sinks" to throughflow systems well before any equilibrium is reached, degrading water quality in aquifers and water bodies downstream[2].

The over-extraction and degradation of fresher groundwater associated with Triassic geology in the upper Goulburn River catchment was linked to a fall in catchment yield and an increase in downstream salinity[3]. The loss of 'fresh' groundwater resources can essentially sterilize land uses for future generations. This is an unacceptable risk that must be fully considered in mine closure plans.

The three mines in the Ulan Wollar area are currently licensed to discharge over 56 million litres per day of excess mine water into the Goulburn River and its tributaries in the Upper Hunter catchment significantly distorting the natural flow regime, affecting volume and peak flow in streams, altering the hydrochemistry and increasing the downstream salt load by 10-25 tonnes per day[4]. The discharged water is a cocktail of intercepted groundwater from the depressurisation and dewatering of groundwater systems and captured surface water, partially treated in reverse osmosis (RO) plants. This has resulted in an '*ad hoc'* regulation of flow in the Goulburn River around the operational needs of mining that mask and superficially 'offset' the loss of base flow. This discharge of excess mine water will predictably cease post mining. So when vital environmental flows are required to ameliorate drought conditions and support riparian vegetation, regulations for 'cease to pump' that apply to mine licenses purchased as 'offsets' will not be recoverable as they are already lost to the system.

The cumulative impacts of coal operations on the hydrological ecosystem of the Goulburn River will inevitably peak in the post mining period. Catchment yield will be significantly reduced as surface run-off and groundwater are intercepted, diverted and drained into fractures and underlying voids created by mine subsidence induced permeability and the depressurisation and lowering of the groundwater table.

The current plan by Moolarben Coal to dispose of saline waste into an underground mine (UG4) adjacent to the Goulburn River National Park and near The Drip gorge(a groundwater dependent ecosystem) risks the further degradation of a valuable water resource. The upper groundwater within the UG4 footprint includes extensive rainfall recharge areas that contribute 'fresh' base flow to the Goulburn River.

The Drip gorge walking track and river corridor lie 200-500 metres from Moolarben Coal UG4 mine panels. Surface movements triggered by mine subsidence pose an unacceptable risk to safe public access to this iconic natural area featuring stunning sandstone cliffs and gorges. The immense popularity and cultural significance of this is an indicator of the potential value of the landscape as a recreational and educational asset to the people of NSW. It serves as an example of key areas that need to be protected from mining for the benefit of current and future generations. **Exploration licences (EL6288) over this area should be relinquished and underground mining stepped back at least two kilometres from the river.**

This valuable asset and source of good quality groundwater for the environment and local communities should not be degraded or lost to future generations. Current approvals in the Ulan Wollar area already permit over 50 million tonnes per year of coal extraction to 2035. There needs to be an immediate stop to any further expansion of coal mining in this region.

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[2] Moser et.al 2024 in Groundwater, "The Hydraulic Evolution of Groundwater-Fed Pit lakes After Mine Closure".
[3] Imrie, J.E. (2019)*"Changing land use in an uncertain climate: impact on surface water and groundwater in the Goulburn River, Upper Hunter Valley NSW"* ANU. *:* http://hdl.handle.net/1885/172041
[4] Salinity of mine water discharge UCML EPL 394 –800-900 μS/cm. MoolarbenCoal EPL 12932 – 619 μS/cm

Future Land Use Potential

Post mine planning must involve open genuine consultation with affected communities.
The rehabilitation of highly modified open cut areas to a sustainable agricultural land-use is problematic due to the destruction of the natural soil and water systems. An interim alternative could be the establishment of solar farms with panel spacing and height designed to augment the recovery of soil biomass and microbiota. Panel shading used to increase water retention during summer extremes and encourage understorey grasses and forbs that can be mown to build up organic matter or strategically grazed to reduce the fire hazard. The long-term aim would be to return these areas to an agricultural land-use once healthy soil conditions are established.

The NSW Government should facilitate the return of key lands to First Nations people.
Access to country is fundamental to First Nations people's self-determination and ongoing practice of culture. The closure of mines offers an opportunity to recognise native title on key lands and return artifacts displaced by mining to country for the benefit of local indigenous groups.

Mine Voids or Pit-lakes
Mining pit lakes should be backfilled and fully rehabilitated unless mine closure plans are able to guarantee a secure productive alternate land-use (with funding) able to sustainably manage water levels, water consumption and water quality into the future. This could be pumped hydro energy storage system or fish farming.

Mine pit-lakes or voids pose a serious risk to catchment water quality requiring ongoing monitoring and management for decades if not centuries. Modelling has shown that mine voids can change from "terminal sinks" to throughflow systems well before any predicted hydraulic equilibrium is reached affecting the long-term water quality of downstream aquifers[5].

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[5] Moser et.al 2024 in Groundwater, "The Hydraulic Evolution of Groundwater-Fed Pit lakes After Mine Closure".