Wilpinjong Coal Mine (WCPL) Modification 3 - Pit 8 Extension
Submission: Review of mining impacts on groundwater and catchment.

Dr Julia Mullins Imrie BSc. Grad Dip Water Res.

30 October 2025

Executive Summary

This review identifies the deficiencies in the environmental groundwater assessment for the Wilpinjong Coal Mine's (WCPL) proposed Pit 8 extension (MOD 3). The project's groundwater impact models are often unvalidated and historically inaccurate, baseline data for the sensitive Wollar Creek aquifer is insufficient, and the assessment fails to account for the mine's legacy of saline water discharge and long-term environmental damage to the water system and catchment.

The assessment of the proposed Wilpinjong Coal Mine Pit 8 extension has significant data and methodological shortcomings. Primary issues include the accuracy of modelling that predict mining impacts on the alluvial and fractured rock groundwater and insufficient baseline monitoring of coal seam and alluvial aquifers in the Wollar Creek water source, designated as *'highly productive alluvium*' and a lack of creek flow gauging data. This proposal will expand mining impacts outside the local Wilpinjong catchment into the Wollar Creek catchment, within EL9399.

Since gaining approval in 2006 (PA 05-0021), modelling for the Wilpinjong Coal Mine (WCPL) has failed to confidently predict the full impact of mining on the groundwater system and alteration of the flow regime on the downstream Goulburn River ecosystem and National Park.

The proposed mine expansion is not a modification; it differs substantially from the current approved mine footprint and requires forensic, independent expert assessment. It is likely to be used to facilitate the much larger expansion (Pit 9 and Pit 10) straddling Wollar creek, further embedding and expanding irreversible impacts.

Key concerns include:

- Groundwater models have a documented history of poor predictive performance and inadequate calibration against observed data
- The mine has failed to effectively manage excess mine water and salt production on-site, requiring daily discharges of excess treated mine water and a number of 'emergency' discharges of saline water into the catchment during high rainfall periods. A pending application to the EPA for a 20 million litres per day increase in mine water discharge, that would triple salt exported, is not addressed in the Pit 8 extension assessment
- Predicted drawdown of groundwater in the Wollar Creek alluvium threaten Groundwater Dependent Ecosystems (GDEs) including protected EPBC vegetation communities in and around the village of Wollar, and baseflows that sustain the Goulburn River.
- The long-term plan for two highly saline pit lakes to remain in the landscape with insufficient mitigation measures reported and planned represents a perpetual contamination risk to regional groundwater.
- Allowing the further expansion of open cut mining into the Wollar Creek area, including the Pit 8 extension, based on a flawed and incomplete assessment, locks in irreversible harm to

water resources and ecosystem health and leaves an unacceptable risk for future generations.

- Further recommend that the approval for void lakes be retracted and current Mine Closure Plans commenced.

1. **Groundwater Modelling** – **"***All models are wrong but some are useful*" George E.P Box

Groundwater modelling for WCPL has required constant revision since 2006 and has consistently failed to accurately predict impacts on the groundwater system. AGE (2005) produced a largely unverified groundwater model, while the Hydrosimulations (2015) modelled impacts for the WCM Extension Project was found to be a poor match to observed alluvial data. The current model (SLR 2025) used for the Groundwater Impact Assessment MOD 3, Pit 8 extension assessment, is discussed below.

There can be little confidence in reliability of the latest modelling predictions for the Pit 8 extension when it incorporates only limited groundwater monitoring of Wollar Creek. There are significant variations in monitoring bore hydrographs that compare observed *'measured'* drawdown to the modelled *'most likely estimate'* (e.g. Layer 1 - GWa7, GWa32 & Layer-7 – GWc4, GWc5). The fact that the volume of alluvial groundwater-take is a modelled estimate suggests rather circular reporting (2024 AR). It also appears the pending application for a 20 ML/day increase in mine water discharge to Wilpinjong creek has not been included in the groundwater model parameters —a major oversight that invalidates many of the predictions.

The interpretation of groundwater movements in relation to required trigger levels appear somewhat negotiable. The model predictions of a substantial reduction in potentiometric head within the coal aquifers was quoted as a justification to dismiss trigger levels as 'unwarranted' (Peabody's 2017 in 2024 AR). The response when 10 of the 17 alluvial monitoring bores along Wilpinjong Creek registered as dry, before exceeding the 1 metre trigger level, was to recommend they be replaced or decommissioned (2024 AR). Monitoring bores GWc1, GWc3, GWc4, and GWc5 located within the coal measures all indicated exceedances for salinity. GWc1 (located near Wilpinjong Creek) frequently exceeded trigger values, was indicating a similar response to GWf3 spoil monitoring Pit 2 lateral flow from backfilled spoil in the open cut pits. This should have been further investigated and mentioned in the MOD 3 report.

The WCM (AR 2024) groundwater review suggested that the current modelling was better at capturing alluvial groundwater response for wet periods of above average rainfall, than for drier periods (2015, 2017-2020). Extreme climate conditions and prolonged droughts is when mining impacts will cause the most damage to the environment. It is disappointing that many of the

observations referred to in the 2024 Annual Review were not further addressed in the GIA Pit 8 extension assessment.

Mining impacts on the hydrological ecosystem of the Goulburn River will inevitably peak in the post mining period (Imrie 2019). The long-term consequences on flow regimes, water quality and catchment health from the extensive dewatering of the landscape and associated depressurisation of the groundwater system are more extensive than have been assumed and predicted in mine development reports and planning approvals. Catchment yield will be significantly reduced for decades as surface run-off and groundwater are intercepted and diverted into the more permeable backfilled pits and voids.

2. Discharge of mine water and export of salt into the catchment

The WCPL was initially approved in 2006 (PA 05-0021) as a 'nil water discharge' mine (EPL12425). However, WCPL inability to manage excess surface and groundwater-make on site required a number of changes to the EPL licence conditions. WCPL was first granted a special 'emergency discharge" variation to EPL conditions (L2.6) between January 2010 and February 2011 allowing the discharge of 353 megalitres into Wilpinjong creek (LDP24). In 2011 the NSW EPA permanently altered discharge Licence conditions to allow up to 5 ML/day of treated mine water at a maximum salinity of 500 μS/cm (LDP24). This was increased briefly to 15 ML/day in 2017, and more permanently to 6.5 ML/day in 2022. Then between October 2022 and February 2023 another special 'emergency discharge' licence was required, allowing the discharge of 1,647 megalitres of untreated mine water at a salinity ~3,250-4,500 μS/cm, that equates to a salt load of over 3,500 tonnes into the Goulburn River system. Since 2017 WCPL has intermittently used four high pressure 'spray evaporators' over Pits 2W and Pit 3 (SLR 2025) essentially evaporating ~ 5ML/day of water into the atmosphere while residual salt and impurities are concentrated and deposited in the landscape. Reverse Osmosis (RO) plant reject brine (14,000 μS/cm EC) is currently sent to Pit 2W, which also acts as the feed dam for the RO plant (WCPL 2025).

The current EPL licence condition *requires "All water discharged from the premises must have a flow regime which is variable and consistent with the ephemeral nature of the flows in Wilpinjong and Cumbo creeks"*. How this has been achieved is undocumented. Conversely mine water discharge from the RO plant is altering the natural flow regime of Wilpinjong creek, while contributing 1-2 tonnes of salt per day to the Goulburn River via Wollar Creek system. Recharge of this discharge water to the underlying alluvium would be distorting both monitoring of groundwater levels and the hydrochemistry.

The MOD 3 report does not mention WCPL current application to the EPA to increase mine water discharge to 20 ML/day, and associated increase in the net salt load from ~1.5tonnes/day to over 5 tonnes per day. This would triple salt exports into the Wilpinjong creek system and Goulburn River National Park, and should have been evaluated in the MOD 3 - PIT 8 extension assessment.

The almost continuous discharge from the mine's water treatment plant is artificially sustaining flow in naturally ephemeral creeks, distorting hydrological monitoring and exporting additional salt activated by mining process into the Goulburn River system.

3. Legacy of Pit Voids and Mounding

Mitigation and management measures to prevent activated salts and impurities leaking from the residual voids and 'mounding' of backfilled pits into the adjacent groundwater and creeks, post mining, is not clearly documented in the WCPL report or how the remaining pit voids maybe sealed. The 2015 Hydrosimulation report puts simply that the *limited connectivity to Wilpinjong and Wollar creeks* would make seepage 'unlikely' to impact surface water quality. Alternatively, WRM (2025) GIA report suggests inflows to Pit 2 and Pit 6 will be a combination of groundwater inflows from *'mined spoil'* and the natural geology, suggesting some connectivity between the enhanced permeability of infilled opencut voids, and Illawarra coal measures. Pre-mining studies (Realica-Turner 2003) indicate upward hydraulic gradients between the fractured rock aquifers (Permian strata) and Wilpinjong Creek alluvium, whereby the artesian groundwater provide baseflow to the creeks.

The waste saline RO concentrate is currently disposed into Pit 2W. The modelled level of salinity in Pit 2, retained as a void lake, is predicted by around 2050 to reach a seawater concentration of **~ 50,000 µS/cm** and an alarming **307,000 µS/cm** over 470 years! Salinity levels in Pit 6 rise to **40,000 µS/cm** by around 2035**,** reaching 64,000 µS/cm at equilibrium (350-400 years). This extraordinary level of salinity is unsustainable, requiring ongoing management over centuries – they should not be permitted in this landscape, their approval should be revoked.

Mine modelling suggests evaporation will depress groundwater levels over the long term, with the void lakes acting as a groundwater 'sink'. Conversely groundwater recovery in the Pit 8 extension post mining is predicted to form mounding and increased baseflows in 20-30 years reversing a predicted 20 metre decline of groundwater levels in the nearby Wollar alluvium. The potential decline in groundwater quality from contact and leaching from crushed rock over-burden within Pit 8 is not assessed in any detail in the current proposal.

These salinity predictions are significantly higher than what existed in the pre-mining catchment. In combination with the predicted rise in the groundwater table and mounding, the potential for highly saline water to migrate and leach into adjacent aquifers and discharge into the catchment flowing into Goulburn River National Park leaves an unacceptable mining legacy and management nightmare for future generations.

4. Groundwater Dependent Ecosystems

The alluvial flats along Wollar Creek and adjacent watercourses are mapped in the GDE Atlas as *'high and moderate potential terrestrial GDEs*'. These vegetation communities contain species regarded as 'facultative' [1] or terrestrial GDEs that intermittently draw on groundwater, particularly during extended dry periods. Three of the High Potential GDE areas lie within Pit 8 footprint.

Modelling in SLR (2025) predicted drawdown of 1-5 metres and 10-20 metres along Wollar Creek alluvium and adjacent water courses. This decline in the water table threatens the viability and resilience of significant vegetation remnants, include up to 100 plus year old mature trees around the village of Wollar (e.g. *Eucalyptus mellidora, Eucalyptus blakelyi, Angophora floribunda).* Losing access to groundwater during extended dry periods threatens these irreplaceable EPBC listed communities. The Hunter Eco (2025) flora study was limited in area (Figure 4) and did not consider or map GDE communities outside a narrow zone encircling Pit 8 or in the vicinity of the village. Depth to water table was based on modelled groundwater contours based on the only three monitoring bores located in the Wollar creek system, (GWa8, GWc5, GWa32) and assumed a 9-metre root depth of the likely vulnerable species and a modelled post mining drawdown of 1-2 metres (SLR 2025). The potential for greater drawdown and water-stress on vulnerable GDE terrestrial vegetation communities has not been comprehensively assessed.

5. Conclusion

The proposed expansion is not a minor modification but a significant alteration that extends mining impacts into the sensitive Wollar Creek catchment. Considering the current impact of the Wilpinjong Mine on the hydrology and connectivity between coal seam and alluvial aquifers the proposed Pit 8 extension poses a significant risk to groundwater levels in the Wollar Creek system. The current NSW planning process that permits the piecemeal expansion of coal mines by 'modification extension' project-by-project, fails to justly assess the full scale of cumulative, long-term impacts that threaten

[1] Ecosystems may be obligate GDEs, with a continuous or entire dependence on groundwater, or facultative GDEs, with an infrequent or partial dependence on groundwater.
https://www.bioregionalassessments.gov.au/assessments/3-4-impact-and-risk-analysis-hunter-subregion/344-groundwater-dependent-ecosystem-gde-landscape-group

the viability and resilience of the Goulburn River system and downstream National Park, allowing a death by a thousand cuts.

Approving this extension based on incomplete and flawed data would cause irreversible harm to the region's water resources and ecosystem health. The assessment relies on groundwater models with a documented history of inaccuracy, ignores a pending application that would triple salt exports into the catchment, and provides insufficient baseline data for the highly productive Wollar Creek aquifer.

The threat to the water catchment of contaminated seepage from groundwater mounding above backfilled pits and retaining two opencut voids poses an unacceptable long-term risk. The predicted drawdown of 10-20 metres in the Wollar Creek alluvium post mining directly threatens Groundwater Dependent Ecosystems and EPBC-listed vegetation, including around the village of Wollar, while the cumulative drawdown in the regional groundwater system is predicted to extend well into the Goulburn River National Park.

The Pit 8 extension proposal is unacceptable and should not be approved. Mine Closure Planning needs to begin to meet the complex challenge of rehabilitating and managing in perpetuity, a significantly modified and degraded landscape and water system, with serious consideration given to removing the two pit voids. To proceed otherwise would be to sanction a legacy of environmental degradation and an unmanageable burden for future generations.

References

AGE 2005. Wilpinjong Coal Project Groundwater Impact Assessment prepared for Wilpinjong Coal Pty Ltd by Australasian Groundwater & Environmental – April 2005

Bureau of Meteorology (2025) Groundwater Dependent Ecosystems Atlas.
Website: http://www.bom.gov.au/water/groundwater/gde/

Hunter Eco (2025) Wilpinjong Coal Mine Pit 8 Modification Baseline Flora in WCPL BDAR App F Report

Hydrosimulations 2015 Wilpinjong Extension Project- Groundwater Assessment Report

Imrie, J. (2019), 'Changing land use in an uncertain climate: impacts on surface water and groundwater in the Goulburn River NSW" ANU Thesis (PhD) http://hdl.handle.net/1885/172041

Realica-Turner, S.A., (2003) Greater Wollar Creek Catchment Dryland Salinity Groundwater Investigation. Hunter Region DIPNR, NSW

PEABODY WILPINJONG COAL Surface Water Management Plan - June 2018
PEABODY WILPINJONG COAL Groundwater Management Plan – August 2017

SLR 2025 - Pit 8 Extension Modification Groundwater Impact Assessment Wilpinjong Coal Mine Appendix D – Prepared by SLR Consulting Australia for Wilpinjong Coal Pty Ltd Sept 2025

WCPL 2023, Wilpinjong Coal Mine – SSD-6764 Water Management Plan Trigger Exceedance 3 October
WCPL 2024 Annual Review _ Appendix 3D – Groundwater Monitoring Data

WCPL 2025 - Water Balance Model Update 2025 27 March 2025 SLR Project No.: 630.032087.00001 SLR