

Submission Ulan West Continued Operations Project - Modification 8 – Impact on mining on groundwater and catchment.

This is an objection to UWCO Mod 8 project.

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Executive Summary

Ulan West Continued Operations (UWCO) Mod 8 proposal has applied to extract 43 MT coal from 17.4 square kilometres area (1743 ha, EL8687) and extend mining six years from 2035 to 2041. The proposed UWCO mine expansion impacts are substantial extending and intensifying environmental damage to the surface water catchment and groundwater systems that flow to the Talbragar River (Murray Darling Basin) and Goulburn River (Hunter catchment). It is far more substantial than a simple “modification” and should be subject to a forensic, independent expert assessment as a New Project.

UWCO Mod 8 proposal refers to ‘four’ new longwalls, in reality the project is for nine (9) very wide longwalls (>400 m) at a relatively shallow depth of 85-205m. To accept longwalls A plus B as ‘one longwall’ at a length of ~5.5km to ~8km makes them potentially amongst the longest and widest longwalls in NSW. More importantly, based on the longwall widths, depth of cover and height of seam extraction it is predicted to reach the surface **over the entire mine longwall layout**¹.

SCT (2025) states *‘the proposed longwall panels are all of supercritical width (where the panel width is greater than 1-1.2 times depth). In supercritical width panels, **fracturing of the overburden strata is expected to extend between the mining horizon and surface** with this overburden strata above the centre of each longwall panel subjected to the full range of subsidence movements.*

This means that aquifers above the longwalls (and for some distance to the sides of the longwalls) in this area will be totally depressurised (and drain into the mine). The cumulative impact of such complete depressurisation of aquifers has not been rigorously assessed or addressed and AGE’s (2025) groundwater model does not appropriately model the predicted surface to seam fracturing. As a result, the model likely considerably underestimates the true magnitude of groundwater drawdown and impacts as a result of the UWCO MOD 8 proposal. This important deficiency in the groundwater model should be referred directly to the Independent Expert panel on Mining

The use of poorly calibrated and largely unvalidated groundwater model outputs in the Groundwater Assessment provides little confidence in the resulting conclusions. At this point in time and without further supporting evidence, little faith is placed in the predictions from the Groundwater model.

Ulan Coal Complex (UCC) monitoring program for the groundwater aquifers, alluvial aquifers and streams are also inadequate, with significant gaps in the necessary baseline data and monitoring frequency required to validate the groundwater model. The limited surface water and alluvial/colluvial monitoring sites are a significant impediment for assessing the impact of the longwalls on streams and ‘verifying’ the model’s predicted baseflow losses.

Approximately half of the land above Longwalls 12-16 is private property (SCT2025). The proposed expansion would directly affect 17 private properties, and at least 14 private bores. Mine subsidence and dewatering of the landscape will severely deplete access to all water resources by the community and groundwater dependent ecosystems in the Blue Springs, Bungabar and Talbragar River area, effectively sterilizing most future land-uses.

¹ Tammetta, P., 2015, “ Estimation of Height of Complete Groundwater Drainage Above Mined Longwall Panels” *Groundwater*, 51 (1), No.5. p122-129

The treatment of GDE's (and potential GDE's), springs and alluvial aquifers are considered superficial. UWCO's cursory investigation into just three (3) identified Springs (Kellys, Gormley, Unnamed) consisted of a general conceptual model, with no supporting monitoring data, analysis of groundwater type, photographs or local history.

In terms of stream impacts, the Central Tributary (4th order stream) to Cockabutta Creek is likely to be fractured and drained with water flowing to the mine due to connective fracturing. The 4th order Central Tributary is likely to cease to flow permanently (except perhaps after extreme wet weather events).

The Southern Tributary (3rd order stream) to Cockabutta Creek (not currently monitored for anything) is also likely to be fractured and drained with water flowing to the mine due to connective fracturing. The 3rd order Southern Tributary is also likely to cease to flow permanently (except perhaps after extreme wet weather events).

The extent of the Talbragar River floodplain (and areas of inundation) can be seen in the 1:25000 topographic maps for the area. The soil/sediments in this area are likely alluvium/colluvium and so during dry times if the river ceases to flow at the surface, then water is still likely to be moving through/within the alluvium. The connectivity of groundwater-alluvium-surface water has not been appropriately considered in the UWCO Mod 8 proposal and the groundwater model is considered to be highly unreliable in predicting the effect of groundwater drawdown in the Talbragar River alluvium, let alone rigorously quantifying baseflow losses.

The conceptual Geological cross-section through The Drip misrepresents the height of groundwater discharge from The Drip face and skews the 'conceptual' hydraulic gradient. It assumes, without providing the necessary evidence, that The Drip water source has no connection to the Triassic groundwater system that also discharge baseflows to the Goulburn River. The UCC Consolidated Consent conditions 33 require that, "*The Applicant **must ensure** that the project has **no impact** on the water supply to the "Drip".*

Overall, is considered that the Ulan Mod 8 proposal pays insufficient regard to the likely environmental effects of the proposed mining or its long-term implications for the maintenance of streams or aquatic and alluvial habitat.

The impact on water quality is also an issue. The proposed installation of coal tailings storage facilities (dams) within a 132ha area abutting the Goulburn River diversion and remnant alluvium represents a significant long-term risk of toxic groundwater seepage into the Goulburn River. UCC currently has an EPL licence to discharge up to 30 million litres per day (approximately 12.5 Olympic swimming pools per day) of treated permeate from the Reverse Osmosis (RO) plant blended with excess mine water. The estimated salt load from this discharge equates to over 17.3 tonnes /day² being pumped into the Goulburn/Hunter River catchment. This Ulan Mod 8 proposal extends this for another six years until 2041, potentially dumping a further 37,000 tonnes salt into the Hunter River system – a catchment already affected in large areas by saline seepage from the Permian geology of the area. The Ulan Mod 8 proposal does not appropriately consider the environmental and downstream effects³ of these salt loads.

² Or 6,300 tonnes per annum.

³ To basic landholder rights for water take for domestic consumption, stock watering, and harvesting; irrigators; and the downstream Hunter Salinity Trading Scheme (HSTS – see EPA 2013).

Key concerns of the *UWCO Modification* include:

- *Underground mine subsidence causing fracturing and depressurisation from the coal seam to the surface causing complete drainage of the groundwater system, over an additional 1734 hectares, affecting waterways and creeks within and surrounding the mining footprint*
- *another six years of continued direct and indirect groundwater interference and drawdown⁴*
- *No confidence in water modelling predictions*
- *Inadequate monitoring of groundwater aquifers, alluvial aquifers, streams and GDEs with insufficient number of key monitoring points and incomplete data sets*
- *Continued discharge of mine water with a salt load up to 17.3 tonnes /day)⁵ into the Goulburn/Hunter River catchment until 2041 (ie total >30,000 tonnes salt)*
- *Proposed installation of coal tailings storage facilities (dams) within a 132ha area abutting the Goulburn River diversion, requiring the excavation of old open cut workings containing reject, and spoil material creating a significant long-term risk of toxic seepage into the Goulburn River.*
- *Absence of past and current monitoring and reporting of groundwater levels and water quality associated with the existing tailings dams (4) connected to the East Pit water storage, with potential connectivity through river alluvium with the Goulburn River should groundwater levels reach a critical height.*

1. **Groundwater Model calibration/validation–**

"All models are wrong but some are useful" George E.P Box

Groundwater modelling for Ulan West Longwalls has been revised and updated many times since the first approval, and despite a '*calibration/validation process*' and numerous model updates, the groundwater modelling has failed to confidently predict the scale and cumulative impacts of longwall mining induced fracturing and dewatering of the landscape on the surface and groundwater systems. These mining impacts, destined to last many decades and even centuries into the future, threaten the very health and viability of the upper Talbragar and Goulburn River catchments, effectively 'sterilizing' irreplaceable groundwater resources of great value to the community now and into the future.

The original groundwater model for the Ulan Coal Continued Operations Ulan West expansion of longwall mining was compiled by Mackie (2009/2011). With the observed monitoring data frequently varying from simulated predictions (and groundwater make), the model has required numerous recalibrations. Significant model updates were necessary in subsequent years with the most recent by AGE (2022) followed by the Approved Operations Model (AOM2024).

AGE (2025) latest modelling for MOD8 (AOM2024) is based on limited monitoring points and incomplete data sets. This is particularly apparent in areas that lie above the majority of the extended mine footprint where there is a significant lack of baseline data supposedly covered by the groundwater model (needed to anchor predictions with reality). As a result, there is significant uncertainty in the model and its predictions, given this lack of baseline data.

⁴ GW 6/312- AIP. UWCO MOD mine plan (AOM2024) predicts peak groundwater inflow from the *North Coast Fractured and Porous Rock* water resource (WSP) will continue at 7,578 ML/year (or 20.6ML/day.) while the peak inflow predicted from the *NSW Murray Darling Basin Porous Rock* WSP, will increase to 5,945 ML/year (or 16.3ML/day) from 5,859 ML/year.

⁵ EPL394 – licensed mine discharge points LDP19 & LDP6= 30 million litres/day @ 800-900 µS/cm

For example, DDH270 & DDH266 will likely be destroyed/drained by LW10 & LW11, leaving DDH293 & TAL1 as the only piezometers likely to be measuring impacts from the Mod 8 proposal (LW12-16). UW3 is west of the longwalls but it is unclear what is occurring with UB3 levels as there has been no water levels recorded over the last 5-6 years, and it also appears affected by data quality issues. In addition, the model poorly predicts TAL1 behaviour and it appears possible that TAL1 has already been impacted by prior longwalls. (Fig.5.3 AGE 2025 EIA - Groundwater monitoring network)

There are also a range of private bores where data collection is infrequent and inadequate, the model either underestimating or overestimating water levels by 5-10 metres (see PB18, PB19, PB21, Fig: 1 below).

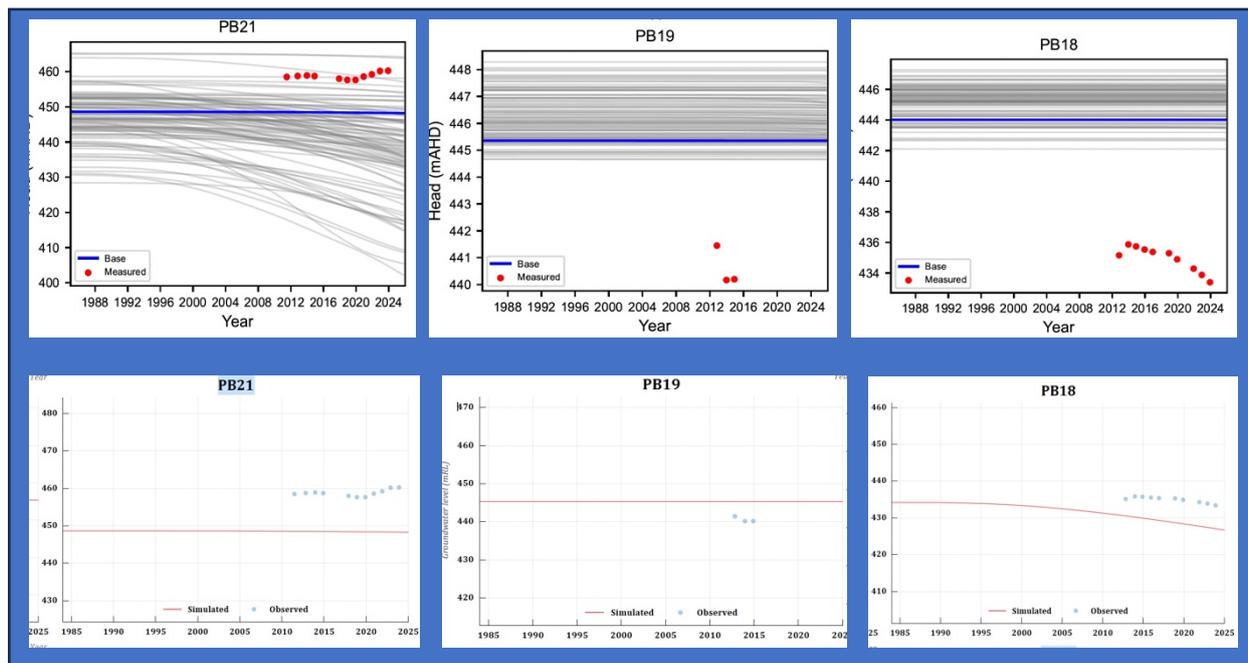


Figure 1 - AGE (2025) – App.D Calibration and Uncertainty Hydrographs

North of the longwalls, near the Talbragar River (regarded as ‘highly productive alluvium’) and the permanent flowing Curryall Creek (in the north-east above UUG), the measured ‘observed’ groundwater levels in private bores PB08 & PB14 (screened into the Triassic and Jurassic strata) differ significantly from the model ‘simulated’ levels by over 20m, while PB26 (Triassic) differ significantly by over 7 metres (Fig. 2.) The recent AGE AOM(2024) modelling predicting mine induced drawdown of PBs near the Talbragar by over 6 metres, and PBs near Bobadeen Creek, east of the mine by 18-32 metres (Table 7.4 AGE).

The inadequacy/inability of the model to replicate observed groundwater levels in these areas significantly diminishes the confidence in the model to predict reality. Model predictions of reduced impacts with groundwater ‘recovery’ and ‘mounding’ *increasing* baseflows in the years 2061-2181, are purely speculative and do not account for potential ongoing leakage through the fractured coal seam.

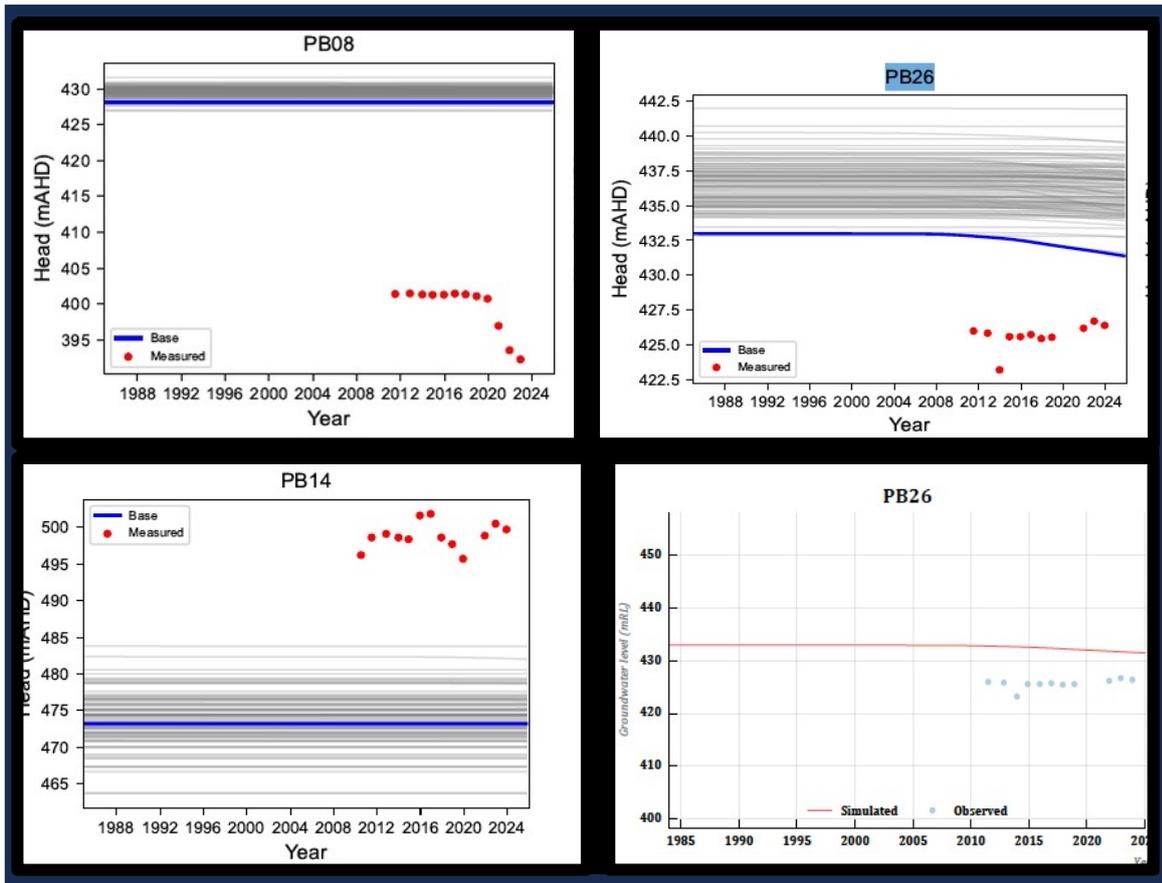
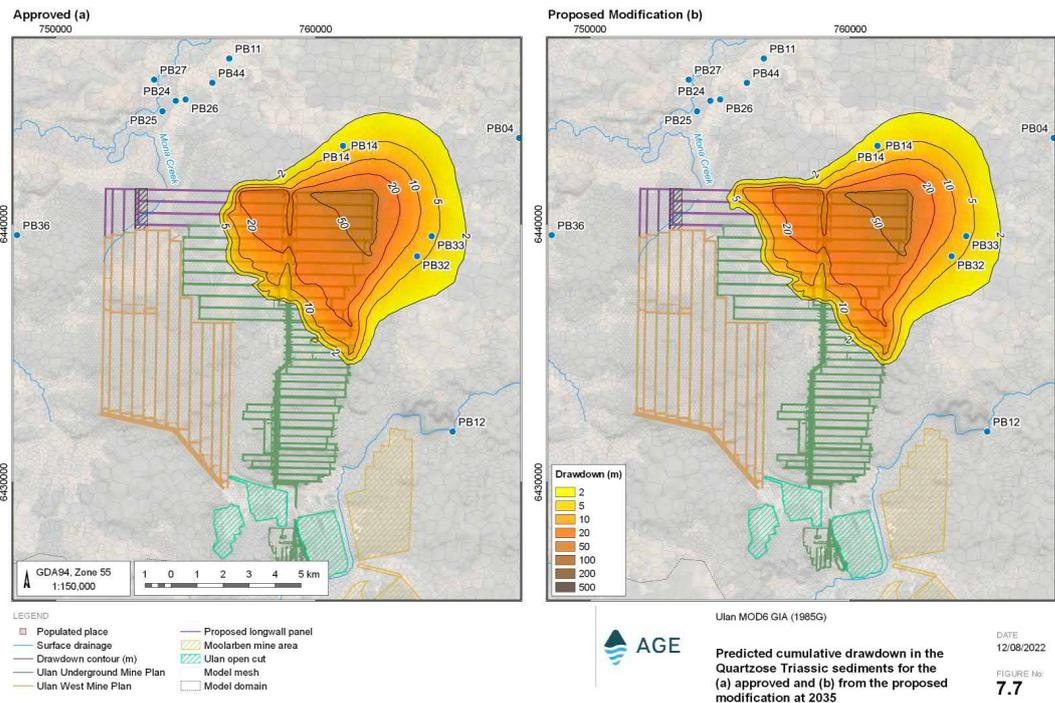
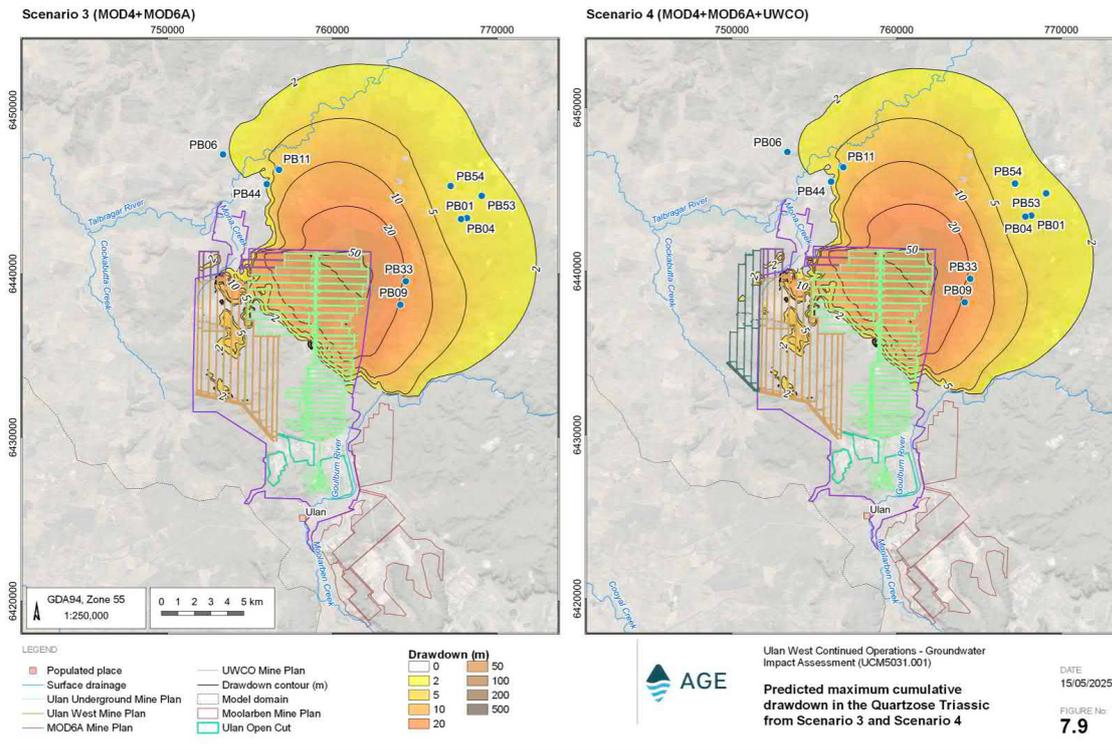


Figure 2 - AGE (2025) – App.D Calibration and Uncertainty Hydrographs

It is important to note that the AGE MOD 6 2022 model (see 7.7 below) **did not initially show mine drawdown of the Triassic groundwater extending as far out as the Talbragar** - affecting private bores PB11, PB24, PB25, PB26, PB44. While a rejigged model of AGE MOD 6 version (for the UWCO proposal) does show the Talbragar being affected by mining drawdown (see 7.9 further below).

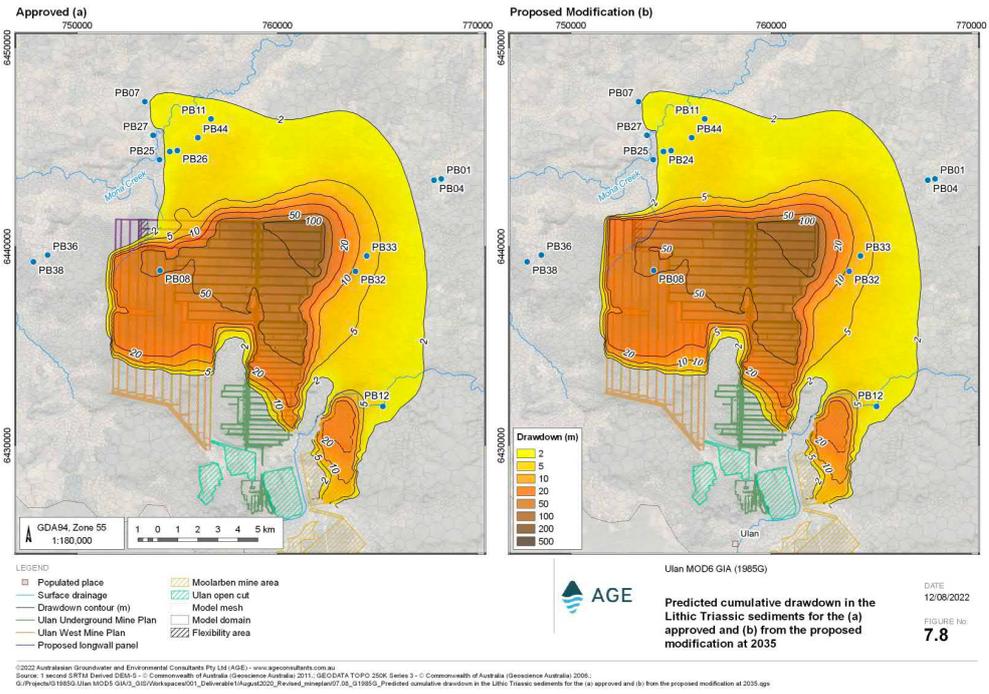


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 Source: 1: revised 2019 Derived Data 3 - Commonwealth of Australia (Geoscience Australia) 2011; GEO DATA TOPD 250K Series 3 - Commonwealth of Australia (Geoscience Australia) 2006;
 G:\Projects\18855_Ulan_MOD6_GIA\3_GIS\Workspace\1_Ulan\workspace1\August2020_Review\mineplan07_07_018855_Predicted cumulative drawdown in the Quartzose Triassic sediments for the (a) approved and (b) from the proposed modification at 2035.gpx

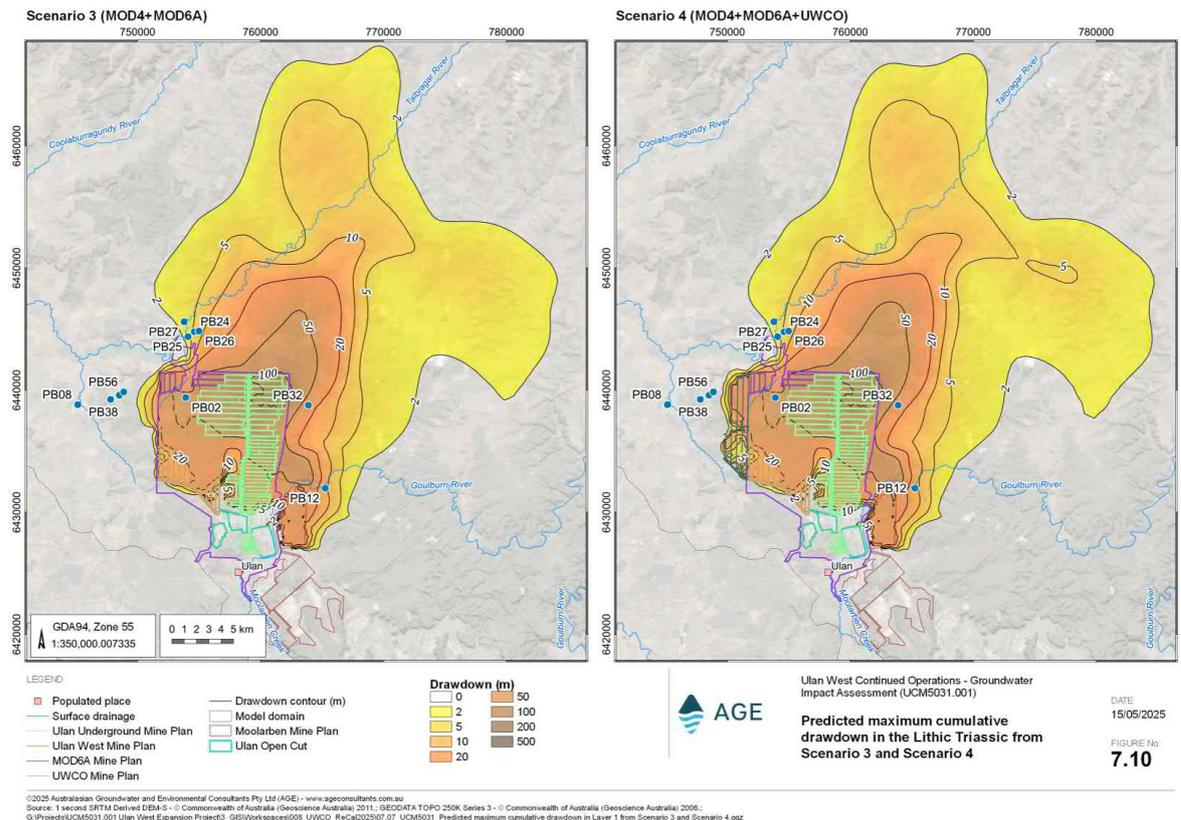


The updated model AOM(2024) shows a significant increase in mine drawdown extending mining impacts to over the Talbragar River in the north, over Curryall creek in the north-east and down to the Goulburn River at The Drip gorge in the south. The proposed mining has the potential to adversely impact the Talbragar River, Curryall Creek, Bobadeen Creek and the Goulburn River catchment and alluvial aquifers. Such impacts have not been rigorously addressed or assessed in the UWCO Mod 8 proposal.

The MOD 6 AGE EIA (2022) version for the Triassic 'lithic layer' demonstrates the dramatic difference between the 'approved' 2022 version of MOD 6 (see 7.8 below) and the AOM(2024) MOD 6 version (see 7.10 further below). Mine groundwater drawdown is now well out to the north over a huge area of the Talbragar River alluvium. South-east of the mine, Triassic groundwater is predicted to decline 50-100m beneath the Goulburn River and The Drip gorge. Such significant increases in the predicted mining drawdown of quality groundwater that provides drought-proofing baseflow to our creeks, rivers and private bores is unacceptable socially and environmentally.



AGE Figure 7.8 2022 Predicted cumulative drawdown of Lithic Triassic MOD 6(+Mod4)



AGE Figure 7.10 – 2024 Predicted maximum cumulative drawdown of Lithic Triassic MOD 6+Mod4.

The UCC Consolidated Consent condition 33. states;
*“The Applicant **must ensure** that the project has no impact on the water supply to the “Drip”.*
 How can UCC *“ensure no impact”* with such inadequate monitoring, incomplete data, modelling uncertainties, and repeated, unreliable and confusing predictions.

2. Springs, Creeks and Groundwater Dependent Ecosystems (GDE)

UWCO Mod 8 proposal has not rigorously assessed the linkage between alluvium/colluvium and other aquifers or investigated springs and spring fed creeks in any detail. It is accepted knowledge that many groundwater and surface water systems are connected to some degree and many ecosystems rely on groundwater for their survival (NWC 2012; Commonwealth of Australia 2013).

There is extremely limited surface water and alluvial/colluvial monitoring sites assessing the impact of the longwalls on the streams of the area (let alone verify the model predicted baseflow losses). UWCO cursory investigation into the three identified Springs (Kellys, Gormley, Unnamed) consisted of a general conceptual model (Fig 5.16 GIA), with no supporting data, analysis of groundwater type, photographs or local history. Other GDEs and the 'spring fed' Curryall Creek, located immediately to the north-east of Ulan underground Mine is ignored in the surface report and remains unmonitored and unassessed. AOM2024⁶ predicted 10-20 metre decline in Triassic groundwater levels in the area, with only one monitoring piezometer (R894) in evidence.

The treatment of GDE's (and potential GDE's) in particular is considered superficial. It is noted that EMM's peer review stated:

Groundwater dependent ecosystems AGE lists Cockabutta Creek as a potential aquatic groundwater dependent ecosystem (GDE), referring to AGE reporting 2021 and 2022 which found that aquatic GDEs along the creek are "more likely to rely solely on rainfall and is therefore not considered inflow dependent". EMM recommends AGE provide a summary of the lines of evidence used, including showing the location of bores where depth to groundwater is noted as being typically greater than 10 m below ground surface. A depth to watertable map would support the GDE discussions in the GIA. For GDEs, drawdown less than 2 m can be significant. EMM recommends reevaluating the drawdown threshold used for watertable drawdown.

The Central Tributary (4th order stream) to Cockabutta Creek is likely to be fractured and drained with water flowing to the mine due to connective fracturing and is therefore likely to cease to flow permanently (except perhaps after extreme wet weather events).

The Southern Tributary (3rd order stream) to Cockabutta Creek (not currently monitored for anything) is also likely to be fractured and drained with water flowing to the mine due to connective fracturing and is therefore also likely to cease to flow permanently (except perhaps after extreme wet weather events).

The extent of the Talbragar River floodplain (and area of inundation) can be seen in the 1:25000 topographic maps for the area ((blue hashed area for 8833-4N LEADVILLE and 8833-4S NARRAGAMBA). Presumably a lot of the soil/sediment in this area is alluvium/colluvium and so during dry times if the river ceases to flow at the surface, then water is still likely to be moving through and within the alluvium. The connectivity of groundwater-alluvium-surface water has not been appropriately considered in the UWCO Mod 8 proposal and the groundwater model is considered to be highly unreliable in predicting the effect of groundwater drawdown in the Talbragar River alluvium, let alone rigorously quantifying baseflow losses.

The Ulan Mod 8 proposal pays very little regard to the likely environmental effects of the proposed mining or its long-term implications for the maintenance of streams or aquatic and alluvial habitat.

⁶ Approved Operations Model 2024 – latest numerical model used by the Groundwater Impact Assessment – Australasian Groundwater and Environmental Consultants Pty Ltd (AGE)

Approximately half of the land above Longwalls 12-16 is private property (SCT 2025). The Mod 8 proposal pays virtually no regard to the effects of their mining on private property or the long-term sustainability of farming operations in this area (once mining ceases) if this mine expansion is approved.

3. The Drip gorge GDE

Mine reports rely on the unproven assumption that The Drip groundwater is from a 'shallow (localised) perched groundwater system' and unconnected to the regional groundwater, but provide no proof only unsubstantiated claims. Some of the known facts are that:

- the presence and reliance of water dependent plants on the cliff face (e.g. *Cladium procerum* – a range extension, grows in coastal swamps). Supports evidence that The Drip is fed by a permanent /perennial groundwater source (not just a perched aquifer that would fail in extended dry and drought conditions).
- Analysis of water from The Drip shows a very similar hydrochemical character to the regional Triassic groundwater, with some influence from the nearby basalt geology (intrusions lie directly to the north of The Drip) [signature Na (Mg) HCO₃⁻] (reference Imrie 2019)
- Regional Triassic groundwater has a hydraulic gradient flow towards the Goulburn River, including The Drip feature, and could thus discharge to either feature

PZ29 (050,072,090, 122- vibrating wire VW) monitoring bore is located 1.2 kms north of The Drip and is the only monitoring piezometer measuring Triassic groundwater levels above The Drip and Goulburn River. Unfortunately, the groundwater hydrochemistry (major ions) of this bore has never been analysed by UCC precluding any comparison of water types with The Drip seep water. Aquifers in this area could potentially contribute the 'perennial' groundwater flow supporting The Drip GDE (the hydraulic gradient flow is towards the river.)

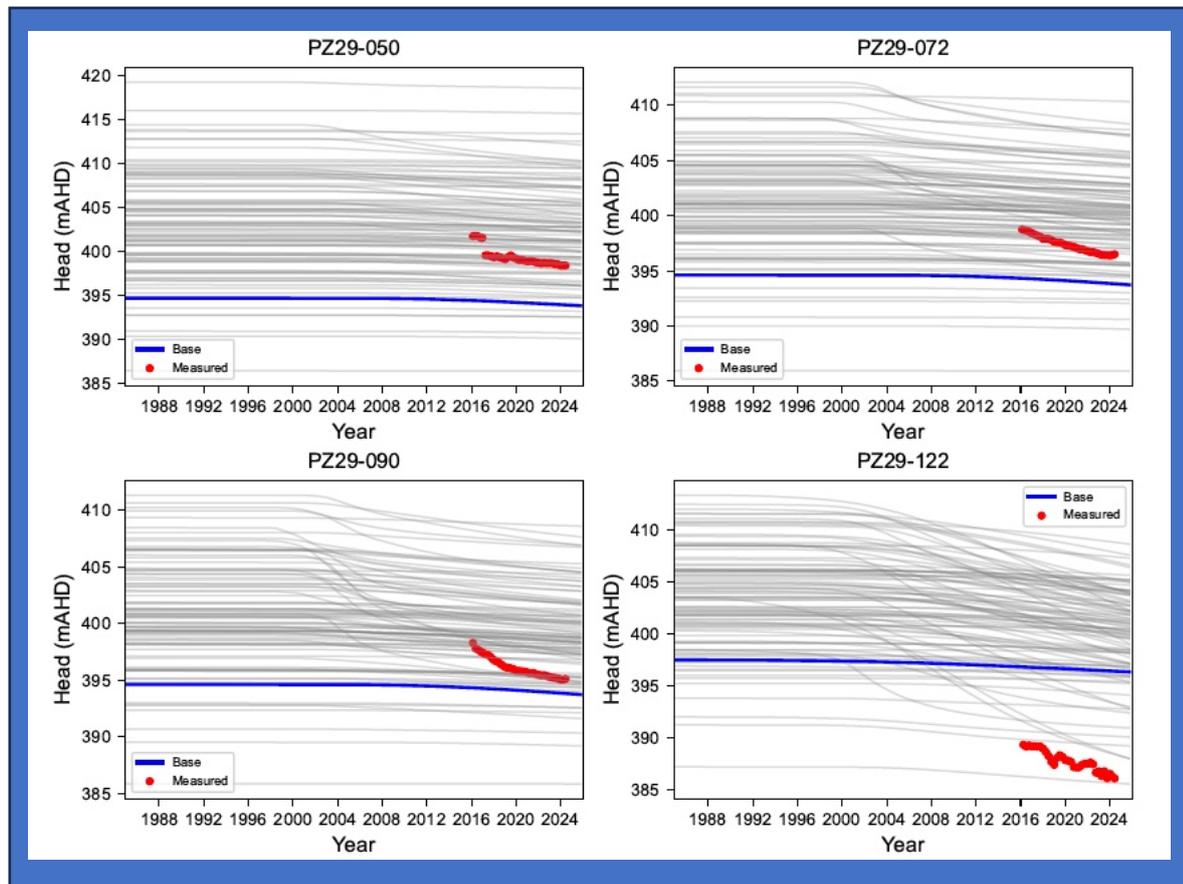


Figure 3: PZ29 (north of The Drip)- AGE (2025) – App.D Calibration and Uncertainty Hydrographs

The Drip water quality exhibits major ion proportions consistent with many of the northern network Triassic monitoring bores (as shown in Piper Plot major ions speciation of groundwaters), influenced by Tertiary basalts (elevated Mg, Ca, HCO₃) (Imrie 2019). These volcanic intrusions dominate the landscape to the north of The Drip, increasing permeability. The simulated 'model cell discretisation' (Layer 7) for The Drip groundwater source is 'assumed' limited and constrained immediately adjacent to the cliff face, so the model predictably forecasts no impact and no connectivity with the regional Triassic groundwater. The 'observed' water levels below indicate a declining trend, and vary considerably from the simulated levels. The latest UCC model update and recalibration (AOM2024) is predicting a 10 metre plus decline for PZ29 in the Triassic strata due to mining (differing from previous reviews denying any mining related drawdown). The AOM2024 Scenario 3 & 4 (see 7.10) indicates a significant 50m drawdown of deeper Triassic groundwater in the vicinity of the River and The Drip gorge over time (AGE 8.12 p. 122/312).

The conceptual Geological cross-section through The Drip (Figure A 2.5) misrepresents the height of groundwater discharge from The Drip face and skews the 'conceptual' hydraulic gradient. See the actual seep level of 382-392mAHD (inserted in red). Groundwater discharge may very likely be subjected to a > 2 metre drawdown over-time in and around The Drip water source and Goulburn River as groundwater gravitates towards the depressurised UCC and Moolarben Coal mine underground goafs. The UCC Consolidated Consent conditions 33 require that, "The Applicant **must ensure that the project has no impact on the water supply to the "Drip"**". How can this be proven or disproven considering the confusing modelling predictions and contradictory reporting?

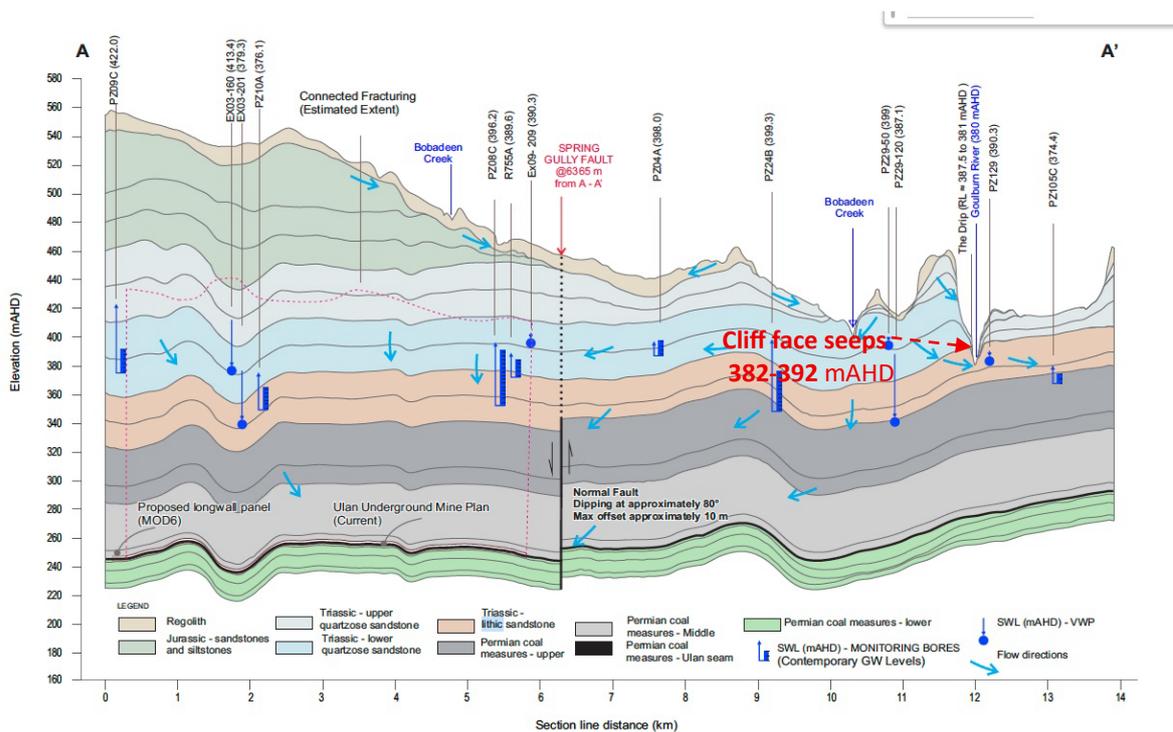


Figure A 2.5
Geological cross section through The Drip (see Figure A 2.1 for A - A' location)
Ulan Groundwater Model Recalibration (UCM5031.001)



4. Expansion of Tailings Dam facilities adjacent to Goulburn River

UWCO plan to dispose of tailings and RO waste from the current and expanded mine operations in a 132ha area abutting the Goulburn River where the diversion meets the original channel – and remnant alluvium (see Fig.4). This location is unacceptable risking groundwater contamination and seepage into the river system over time – either through the diversion OR the remnant river

alluvium, and is a threat to the downstream National Park, including the popular recreational area known as The Drip gorge, Goulburn River.

During extreme or prolonged rainfall events, it is not practicable solution to manage overflow from this facility by ‘pumping’ from dams or lowering groundwater levels subject to ‘mounding’. Nor assume any seepage will report/drain to the east pit, which has potential connectivity to the groundwater system⁷ (and the river) when levels exceed 364- 385mAHD. There appears to be no detailed monitoring or assessment of the subsoil contained within the original Ulan Coal Open-cut (Pit 1) apart from a reference to an Aurecon report – not supplied. It appears the potential risk from stock-piled overburden and removal of established 6 -30 year-old native revegetation stabilising this fragile area, have not been considered in any detail.

Ulan Coal commenced post open-cut and site rehabilitation in the late 1990s, with additional targeted re-vegetation occurring under the 2016 “*Approved Goulburn River Diversion Remediation Plan*”. Analysis of a selection of subsoil samples collected in 2016 across the general area were found to exhibit high salinity, elevated acidity/alkalinity (i.e. sodicity, and highly dispersive soils)⁸. When the River diversion rehabilitation was initially discussed with the Ulan Community Consultation Committee (UlanCCC -Minutes-21April2009) it was asked if battering the banks to a stable angle would expose mine waste in the old workings. The CCC was informed this placement of buried spoil and tailings previously disposed in the backfilled opencut pit was an issue that needed to be addressed. The MOD 8 proposed location of tailings dams is high risk and should not be approved.

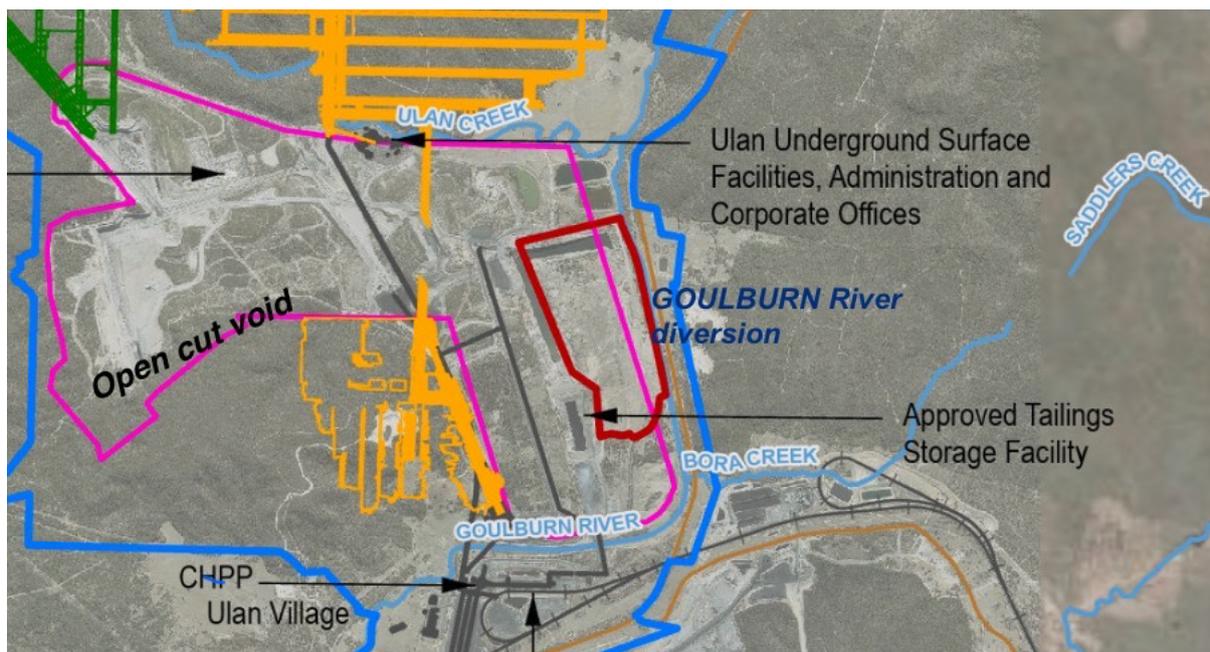


Figure 4 – from Operations Modification Report - Red line delineates (132 ha) extension of “*infrastructure area*” to very edge of river diversion requires clearing of 6–30 year-old native vegetation regrowth, the excavation of old open cut working and stockpiling of overburden reject waste and tailings buried in 1990s.

⁷ 7.2.7 Appendix 7 – Surface Water Impact Assessment Table 24 p. 63/160 - North West Sediment Dam Water Treatment. Umwelt

⁸ Ulan Coal – Glencore 2017 Plan for Goulburn River Diversion Erosion and Sediment Control Plan

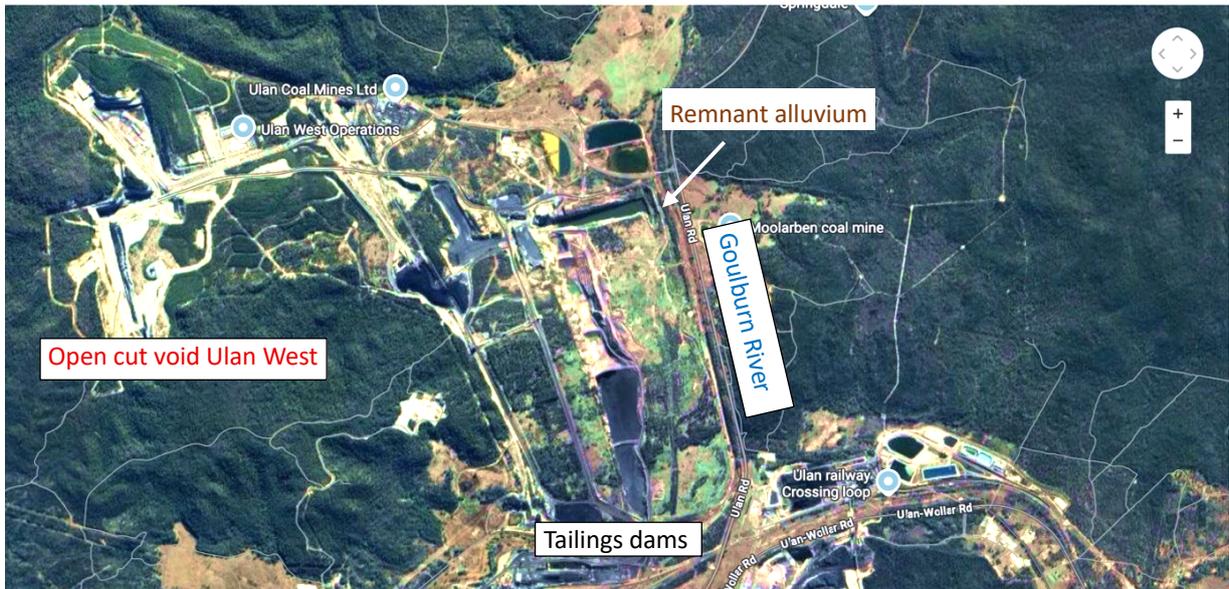


Figure 5 - Google Maps aerial of the site, that shows the current active (4) tailings dam along the south arm of the East-pit infrastructure and open cut void that require monitoring

5. Salt Load discharge to the Goulburn River

UCC currently has an EPL licence to discharge up to 30 million litres of treated permeate from Reverse Osmosis (RO) plant blended with excess mine water with a water quality of 800 (50%tile)- 900 $\mu\text{S}/\text{cm}$, pH 6.5-8.5, TSS - 50 mg/L (Total Suspended Solids). The estimated load of salt in this discharge equals over 17.3 tonnes /day⁹ being pumped into the Goulburn/Hunter River catchment. This proposal extends this for another six years until 2041, potentially dumping up to 38,000 tonnes salt into the Hunter River system – a catchment already affected by seepage from saline geology in some areas.

Recommendations (for points 4 & 5 to be referred to the EPA):

- An alternate disposal site should be found, such as the open cut void in Ulan west infrastructure area
- UCMPL should be required to install groundwater monitoring bores between the current four tailings dams , the East Pit and the river (Fig.5) and report monthly on standing water levels and groundwater quality and risk of connectivity or leakage to the Goulburn River alluvium or river bed.
- Analysis of downstream river water quality is currently limited to only four parameters (pH, EC, Turbidity). Both mine water discharge and downstream surface flow should be fully analysed for a suite of hydrochemical parameters (metals and salts) and reported 4 times per month (random/weekly grabs)

Recommendations (to be referred to the Independent Expert Panel on Mining)

- I. Review the potential for surface to seam connective fracturing to occur with the proposed **411m wide** longwalls. Given the longwall configuration, depth of cover and seam height extraction, Tammetta's equation predicts surface to seam fracturing over the entire footprint of the proposed mine expansion.

⁹ EPL394 – licensed discharge points LDP19 & LDP6 - 30 ML x 850EC x 0.68 ($\mu\text{S}/\text{cm}$ to mg/l conversion)/1000

Age (2025) has not provided a rigorous assessment of surface to seam fracturing for the proposed mine layout, simply stating:
Observations (refer to Section 5.8.1 and Appendix A) have guided the application of the empirical formulas to determine the height of continuous fracturing. Available information shows that the zone of continuous / connected fracturing has / will come to the surface in the southern extents of the approved mine plan. No areas in the proposed modification mine plan are expected to fracture to the surface. The impact assessment is covered in Section 7 and groundwater modelling has included hydraulic property changes due to fracturing, the impacts of which are encapsulated in the predictions.

SCT (2025) state *the proposed longwall panels are all of supercritical width (where the panel width is greater than 1-1.2 times depth). In supercritical width panels, **fracturing of the overburden strata is expected to extend between the mining horizon and surface** with this overburden strata above the centre of each longwall panel subjected to the full range of subsidence movements.*

- II. Review the adequacy of current monitoring of alluvial/colluvial, Triassic, Jurassic and Permian aquifers above the mine layout as well as the lack of any contemporary monitoring of flows for many tributaries (e.g. the Strahler 3rd order or higher streams) above the longwall layout.
- III. Investigate the calibration and validation of the Surface Water and Groundwater Models and assess the congruence of modelled output with 'real' measured data. Assess the veracity of baseflow loss predictions and review the current monitoring program's ability to verify such baseflow loss predictions are realistic and not significantly underestimated (especially due to the likelihood of surface to seam connective fracturing).
- IV. Review the poor level of agreement of modelled versus observed data for the Groundwater Modelling and the lack of any presentation of AWBM model predicted versus actual measured data for streamflow in the area. Assess the implications of the lack of concordance between measured and modelled data on flow losses in the 3rd order and higher streams above the longwalls as a result of the Ulan Mod 8 Extension Proposal.
- V. Review the adequacy of the groundwater dependent ecosystem (GDE) assessment.
- VI. Review the magnitude and consequences of salt loads discharged from Ulan Mine to the Goulburn River in recent years and the potential effect it has on the Goulburn River and the Hunter River catchment more broadly.

6. Conclusion

There can be little confidence in reliability of the latest modelling predictions for the UWCO longwall extensions when there are very limited surface water monitoring and significant variations in monitoring bore hydrographs that compare observed 'measured' drawdown to the modelled 'simulated' or 'most likely estimate'. These models are not verified as they have failed to accurately predict significant impacts on the groundwater system needing constant updating and revision.

The coverage and frequency of monitoring of groundwater aquifers, alluvial aquifers and streams in the extended area are inadequate and lack necessary baseline data to validate predictions from the groundwater model. The limited surface water and alluvial/colluvial monitoring sites are a significant impediment for assessing the impact of the longwalls on streams or for 'verifying' the model's predicted baseflow losses.

Mine environmental assessments for the many expansions and 'modifications' have consistently understated impacts by focusing on the 'incremental' differences', and avoiding assessment of the whole, landscape scale impacts and serious consequences over time, particularly post mining.

These impacts represent a serious long-term dewatering of the landscape over an extensive watershed, that supports numerous springs and seeps critical in dry periods and is culturally and socially important.

The modelling predictions are unreliable and a very poor basis to predict the long-term consequences of mining and the potential for any 'recovery' of useful water resources in this area. The cumulative consequences of dewatering this landscape will be an unjust legacy left to community and governments to manage, essentially sterilizing water resources in an ever-widening footprint around the expanding coal mines.

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