Submission on Surface Water and Closed-Loop Claims

Hillgrove Mine – DA 98/35 Modification 5

Executive Summary

This submission examines the surface-water implications of Modification 5 with specific attention to the project's repeated characterisation of its water management system as effectively 'closed loop'. While the Modification Report asserts negligible impacts on downstream water quality, catchment yield, and surface-water availability, the proposal simultaneously expands surface-water capture, storage, licensed extraction, and associated infrastructure.

Such a system is not hydrologically closed in any strict sense, but conditionally contained and dependent on infrastructure performance and management controls. The assessment does not adequately examine how surface-water risk behaves under exceedance conditions, nor does it define enforceable thresholds or mandatory responses should containment assumptions fail. In the absence of clearly articulated trigger-action frameworks, residual risk is effectively transferred to the receiving river system through approval rather than resolved through design. Until these contradictions are explicitly addressed and translated into binding conditions, claims of reduced or negligible surface-water impact remain insufficiently substantiated.

Main Submission

This submission addresses the surface-water implications of Modification 5, with particular focus on the project's repeated characterisation of its water management approach as effectively 'closed loop', and the evidentiary and regulatory consequences of that framing.

The Modification Report asserts that water quality impacts on the receiving river system will be reduced, that loss of catchment yield will be negligible, and that availability of surface water to downstream users will not be affected. These are unqualified conclusions that warrant careful scrutiny.

At the same time, the proposal involves expanded surface-water capture and storage, upgraded and additional dams, new pipelines and ponds, reliance on licensed surface-water extraction, and detailed modelling of downstream flows and ephemeral tributaries. A system that requires expanded capture, storage, licensed take, and downstream flow modelling is not hydrologically closed in any strict sense. It is a managed system whose performance depends on infrastructure integrity, operational controls, and ongoing containment assumptions.

The assessment acknowledges that contaminated water is managed through interception, capture, reuse, and recovery systems designed to prevent discharge to Bakers Creek and the downstream river system. This framing implicitly recognises that the mine exists within an active surface-water catchment and that separation from the receiving river system is conditional rather than absolute. Surface-water risk is therefore not eliminated; it is displaced into management performance.

The assessment does not adequately examine how that risk behaves under exceedance conditions, including intense or prolonged rainfall, flood events, storage capacity limits, or coincident stressors across the catchment. In headwater settings characterised by steep topography and escarpment margins, containment systems are inherently more sensitive to exceedance, as failure or overflow pathways are short, gravity-driven, and rapidly transmitted to receiving waters.

Modification 5 extends mine life, increases processing rates, and increases the scale and duration of tailings-related infrastructure. Even where individual discharge pathways are reduced, the proposal increases the temporal footprint, complexity, and dependency of surface-water management in a sensitive headwaters environment. The surface-water assessment does not clearly articulate thresholds at which impacts become unacceptable, nor does it define binding trigger-action responses when those thresholds are crossed. Monitoring without predefined decision points functions as observation rather than protection.

The assessment relies heavily on qualifiers such as ‘likely’, ‘minor’, and ‘negligible’ while simultaneously acknowledging dependencies on local structural conditions, infrastructure performance, and management controls. These positions are not reconciled. If impacts are genuinely negligible, the scale of proposed surface-water infrastructure, licensed extraction, and modelling effort should be minimal. If they are not, the assessment must transparently identify the residual surface-water risk being retained on-site and the circumstances under which that risk may be transferred to the receiving river system.

Genuinely closed-loop water management systems do exist in mining and industrial contexts, but they are characterised by clearly defined boundaries, minimal reliance on

surface-water take, no routine interaction with receiving river systems, and conservative design margins that explicitly account for exceedance and failure modes.

In such systems, water is fully retained within sealed or lined circuits, losses are limited to quantified evaporation or product moisture, and any residual risk is retained and managed entirely on-site through redundant containment and enforceable trigger-action frameworks. Where closed-loop claims are robust, they are typically supported by explicit definitions, conservative water balances, independent verification, and binding conditions that preclude reliance on downstream river environments as buffers for uncertainty.

The presence of recognised closed-loop precedents underscores the importance of precision in language and assessment: systems that depend on expanded surface-water capture, licensed extraction, downstream flow modelling, and conditional infrastructure performance do not meet the same standard of hydrological closure and should not be characterised in equivalent terms.

Surface-water systems are living systems with finite capacity to absorb disturbance. Treating them either explicitly or implicitly as buffers for unresolved uncertainty shifts risk away from the proponent and onto the river, downstream human and ecological communities, impacting other businesses (eg the oyster industry) rather than one's own.

The Macleay River system is an interconnected, downstream-propagating system whose health is already compromised by cumulative pressures across its catchment, including altered hydrology, water-quality stressors, and repeated disturbance events. Impacts arising in headwater and tributary systems do not remain localised but are transmitted downstream, interacting with existing loads and vulnerabilities. In such systems, additional conditional risk cannot be assessed in isolation, because incremental stress may contribute to threshold exceedance well beyond the project footprint.

Assessment of surface-water impacts must therefore recognise the river as an integrated system operating under cumulative constraint, rather than as a discrete receiving environment with unused assimilative capacity.

Policy context — water sharing plan remaking: NSW water sharing plans for many unregulated rivers, including those covering the Macleay system, lapsed on 1 July 2025 and are now in the process of being replaced with new plans anticipated to commence in 2026**.** Under the *Water Management Act* framework, these plans set legally binding rules for when and how water may be taken, including provisions designed to protect environmental health, sustain long-term water resource viability, and manage water availability during low flows. Recent government consultation on revised access rules for other inland unregulated water sources has emphasised stronger protections for low flows, native fish movement, water quality, and connectivity of river systems — reflecting a regulatory intent to reinforce environmental outcomes as a water sharing

objective. While specific replacement rules for the Macleay unregulated plan have not yet been finalised or published, this broader policy direction highlights an evolving statutory context in which surface-water management and extraction rights must align with updated environmental safeguards, including more explicit flow protections and environmental considerations in decision-making processes.

The responsible use of language is a substantive obligation in environmental assessment because language shapes how risk is allocated, understood, and governed. Terms such as ‘closed loop’, ‘effectively contained’, and ‘no discharge under normal operations’ imply that surface-water risk has been eliminated or neutralised. In this assessment, those implications are relied upon to support conclusions of negligible downstream impact, while the same documents describe a system that is conditional, infrastructure-dependent, and vulnerable to exceedance. This creates a material gap between what is suggested and what is actually delivered. Where containment is contingent rather than absolute, this use of language implies closure functions to obscure residual risk and to transfer that risk, by default, to the receiving river system.[1] Such slippage is not benign: it shifts the burden of uncertainty away from the proponent and onto the river and downstream communities without explicit acknowledgement or consent. In a sensitive headwaters catchment, precision of language is therefore a matter of governance integrity. Claims of containment must accurately reflect limits, failure modes, and residual risk, rather than relying on qualified or softened phrasing that overstates certainty while understating consequence.

In this context, the role of government cannot be treated as neutral. The State acts simultaneously as the authority enabling extractive activity and as the steward of surface water systems held in the public interest. Where uncertainty remains unresolved in project design or assessment, approval does not eliminate that uncertainty; it determines where the residual risk is carried. If containment assumptions fail under exceedance conditions, the risk is not borne by the proponent alone but by the receiving river system and downstream human and ecological communities. Responsible environmental governance therefore requires that uncertainty be resolved conservatively and explicitly, rather than deferred to monitoring or management discretion. In circumstances where a river system is already subject to cumulative pressures, the balance of responsibility must lie with protecting the river’s capacity to recover, not with extending reliance on it as a buffer for unresolved risk.

Any proposal that claims to be effectively closed loop while simultaneously expanding surface-water capture, storage, licensed extraction, and downstream modelling must resolve that contradiction explicitly. Until containment assumptions are tested against credible exceedance and failure modes, translated into enforceable thresholds, and linked to mandatory response actions, the receiving river system continues to carry unacknowledged risk.

This submission does not argue that surface-water impacts cannot be managed. It argues that the manner in which risk is characterised and governed matters. Modification 5 relies heavily on the language of "closed-loop" water management to support conclusions of negligible downstream impact, yet the system described is conditional, infrastructure-dependent, and reliant on surface-water capture, licensed extraction, and managed discharge pathways.

Genuinely closed-loop systems do exist, and where they are proposed, they are defined by clear boundaries, conservative design margins, explicit exceedance thresholds, and enforceable trigger-action responses that retain risk on-site rather than transferring it to receiving river systems. If Modification 5 is to be characterised in these terms, that standard must be met explicitly and transparently.

Where it is not, continued reliance on "closed-loop" framing functions to obscure residual surface-water risk and to normalise its transfer to the river system. Approval in those circumstances is not a neutral act: it is a decision to accept uncertainty on behalf of the river and downstream communities. Responsible environmental governance requires that such decisions be made explicitly, conservatively, and in a manner that prioritises the river's capacity to recover rather than its assumed capacity to absorb further risk.

Footnote

[1] For the avoidance of doubt, this submission does not dispute the proponent's intent to manage and minimise surface-water impacts. It challenges the precision of language used to characterise residual risk. Environmental assessment materials must enable a reasonable decision-maker to clearly understand where risk is eliminated, where it is conditionally managed, and where it persists. Language that implies hydrological closure, while relying on contingent infrastructure performance and management controls, risks obscuring that distinction and may lead to under-appreciation of residual risk at the approval stage.

Citations

- UNSW Water Research Laboratory (WRL), Clybucca Wetlands - Water Quality Analysis (WRL TR 2025/04, October 2025).
- NSW Department of Primary Industries, Macleay Catchment Ecohealth Report Card (2016).

- ANZECC/ARMCANZ (2000), Australian and New Zealand Guidelines for Fresh and Marine Water Quality (and subsequent online updates administered by DCCEEW).
- NSW Environment Protection Authority / DCCEEW, Macleay Catchment water quality and floodplain wetland assessments (various).
- ICMM (International Council on Mining & Metals), *Water Stewardship Framework* - sections on closed-circuit water use and zero-discharge systems.
- Australian Government, Department of Climate Change, Energy, the Environment and Water (DCCEEW), *Leading Practice Sustainable Development Program for the Mining Industry - Water Accounting and Management*.
- Wels, C. et al. (2016). *Water Balance Modelling in Mining Environments* - discussion of closed-circuit and near-zero discharge systems.