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Joe Fittell
Team Leader
Resource Assessments (Coal & Quarries)
Department of Planning, Industry and Environment

Dear Joe,

RE: MOUNT PLEASANT OPTIMISATION PROJECT – HYDROGEOLOGIC FINAL VOID REVIEW

MACH Energy Australia Pty Ltd (MACH) provided a response to the targeted peer review completed by Hugh Middlemiss of HydroGeoLogic Pty Ltd (referred to herein as the 'Initial HydroGeoLogic Review') in December 2021.

Final peer review comments were provided by HydroGeoLogic following receipt of MACH's response (letter dated 8 February 2022; referred to herein as the 'Final HydroGeoLogic Review'). The Final HydroGeoLogic Review included a number of matters to be considered further as part of the ongoing mining, rehabilitation and environmental management process for the Mount Pleasant Optimisation Project (the Project). These recommendations are summarised as follows:

1. Further groundwater-related analysis of the no-void option, including consideration of alternative spoil recharge rates.
2. Consideration of additional groundwater parameters in the sensitivity/uncertainty analysis for the preferred Project final landform.
3. Further analysis of the post-mining water quality in the Project final void.
4. Assessment of other potential causal pathways for impacts associated with the final void.

These recommendations are addressed in the following sub-sections.

1. Further Analysis of the No-Void Option

The Final HydroGeoLogic Review recommended additional groundwater-related analysis of the no-void option presented in the EIS be undertaken as part of the ongoing mining, rehabilitation and environmental management process for the Project, including assessing the potential for reduced recharge rates to alter the post-mining water table, and thus potentially minimise flows from the backfilled void towards the Hunter River.

Attachment 8 of the Environmental Impact Statement (EIS) described the following primary issues associated with the no-void scenario:

- The rehabilitation costs for the no-void option would increase by over $1 billion relative to the rehabilitation costs associated with the Project final landform. These additional rehabilitation costs would render the Project uneconomic.

- In addition to the significant additional rehabilitation costs, the no-void scenario would result in the following:
  - Mining inefficiencies and environmental risks associated with rehandling emplaced coal rejects and potentially acid forming (PAF) material associated with the Wynn Seam.
  - Delays to the establishment of woodland rehabilitation until emplacement areas reach the final landform surface.
  - Storage of topsoil for extended periods of time, reducing its value for rehabilitation.

The prolonged operation of the mining fleet to rehandle waste rock post-mining would also result in a continuation of noise and air quality impacts (including fleet necessarily operating in exposed areas), visual impacts associated with the removal of the Eastern Out-of-Pit Emplacement (which has been established to shield views of mining operations from the town of Muswellbrook) and associated greenhouse gas emissions from consumption of additional diesel fuel.

Attachment 8 of the EIS considered the above and concluded:

> *MACH recognises that a no-void scenario would have some environmental benefits by restoring additional land to potential productive post-mining use, removing a potential long-term saline water body from the landscape and restoring free-draining catchment to the Hunter River. However, the additional operational costs and environmental consequences described above are considered to significantly outweigh these potential benefits.*

MACH considers further groundwater-related analysis of the no-void scenario is not warranted given it is not a plausible Project scenario (i.e. the no-void scenario is sub-optimal for a variety of economic and environmental reasons and further groundwater-related analysis of this option would therefore be redundant).

2. Further Sensitivity and Uncertainty Analysis of the Project Final Landform

The Final HydroGeoLogic Review recommended that the Project final void scenario be subject to additional groundwater sensitivity and uncertainty analysis as part of the ongoing mining, rehabilitation and environmental management process for the Project.

Section 7 of the EIS states the following regarding future groundwater model reviews:

> *The numerical model developed and used for the Groundwater Assessment (Appendix C) would be used as a management tool for the periodic review and calibration of predicted groundwater impacts through the life of the Project.*
>
> *The results of the groundwater monitoring program would inform progressive refinement of the numerical model. Revised outputs from the numerical model would be reported in the Annual Review, as relevant over the life of the Project and used to inform regular site water balance reviews (Section 7.9.5).*

The groundwater model would continue to be updated to progressively incorporate additional groundwater monitoring data, consistent with the above commitment. There are also likely to be improved groundwater modelling methodologies that are developed over the life of the Project. In advance of mine closure (e.g. five years prior), final void modelling would be revisited utilising the contemporary groundwater model (as updated over the life of the Project) and would include appropriate groundwater sensitivity and uncertainty analysis at that time (including consideration of spoil recharge using site-specific data gathered over the life of the mine).

MACH is prepared to accept a Development Consent condition that requires periodic updates of the site groundwater model, including collection of data over the life of the mine to inform modelling of the final void water level (such as spoil recharge rates).

3. Final Void Water Quality Analysis

The Final HydroGeoLogic Review recommended further assessment of final void water quality as part of the ongoing mining, rehabilitation and environmental management process for the Project, including for parameters other than salinity.

The Geochemistry Assessment (Appendix K of the EIS) concluded the waste rock and coal reject materials generated from the Project would generally be expected to be non-acid forming (NAF). The acid base accounting test work indicates, however, that a small portion of the geological material at the Mount Pleasant Operation, namely the Wynn Seam coal and overlying Archerfield Sandstone interburden are PAF (RGS, 2020). As described in previous responses to the Department, PAF material at the Mount Pleasant Operation would continue to be managed in accordance with the approved Mining Operations Plan. Section 3 of the EIS also described that PAF material exposed in the floor of the final void would be either:

- covered with NAF waste rock material to a minimum depth of 5 m;
- excavated and disposed of as PAF waste rock material (as described above); or
- flooded with water from the site water management system.

Accordingly, PAF material is not anticipated to materially affect post-mining water quality in the final void.

RGS (2021) describes that metal/metalloid concentrations in the final void pit lake will be strongly influenced by factors such as pH, redox and temperature conditions. Therefore, RGS (2021) state that static and kinetic leach data for soluble metal/metalloids from geochemistry testwork tests cannot be used directly in final void pit lake calculations.

MACH would continue to consider potential alternative and feasible beneficial uses of the final void over the life of the Project, including:

- Opportunities for renewable energy projects (e.g. floating solar facility and/or pumped hydro), including consideration of advancements in renewable energy technology that may occur over the life of the Project.

- The potential application of evaporative controls to maintain water quality suitable for productive use and/or to provide a significant off-river storage of supplementary water flows in the Hunter River.

These potential final void beneficial uses would be subject to separate assessments and approval, and do not form part of the Project. The application of a final void use for water storage and supply (e.g. pumping water in and out of the void) would minimise evapo-concentration effects and materially alter final void water quality outcomes.

Accordingly, MACH would undertake detailed final void water quality modelling in advance of mine closure and/or as part of the separate environmental assessment and approval process required to authorise an intended final land use. This may include geochemical modelling based on site-specific conditions (e.g. pH, redox and temperature) and focus on how the final void water quality would be managed to achieve the intended post-mining use (as determined at that time).

4. Potential Post-mining Water Quality Impacts

The Final HydroGeoLogic Review recognised that the Project final void would be a groundwater sink and that there is no potential for density-driven flow to mobilise poor quality groundwater away from the final void. Notwithstanding, it recommended assessment of other potential impact pathways be undertaken as part of the ongoing mining, rehabilitation and environmental management process for the Project on the basis that *"there appears to be no established definition for 'non-polluting'"*.

MACH does not concur with the HydroGeoLogic interpretation that containment of saline water on-site in the final void would fail to be 'non-polluting' in this context, as this outcome is consistent with the existing conditions under Development Consent DA 92/97 which require the site to be *safe, stable and non-polluting*, and also for the final voids to be *designed as long term groundwater sinks to maximise groundwater flows across backfilled pits to the final void.*

MACH suggests the Department could clarify in relevant Consent Conditions that 'non-polluting' in the context of post-mining rehabilitation objectives is referring to the potential for 'off-site pollution'.

The Final HydroGeoLogic Review provided examples of alternative causal pathways for potential impacts, including physical hazards to humans, stock or wildlife, water quality hazards such as toxic algal blooms and/or disease vectors. With respect to these types of causal pathways, MACH notes:

- The Project final landform is unlikely to present a greater risk of impact than the approved final landform (which consists of three final voids with a greater combined surface area).
- The potential for these types of impacts to occur is highly dependent on the final land use of the void (e.g. access to the void by humans and/or livestock may be restricted, or water quality would be managed if used as an ongoing water storage facility).

Accordingly, MACH would evaluate the need for any controls with respect to alternative causal pathways as part of final void water studies in advance of mine closure, and/or as part of the separate approval process required to authorise an intended final land use.

Please feel free to contact me if you require further information.

Yours sincerely,

Chris Lauritzen
General Manager - Resource Development
Mount Pleasant Operation