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28 June 2022

Chair – Independent Planning Commission
Professor Alice Clark
C/- Brad James, Principal Case Manager
Suite 15.02 Level 15 135 King Street
Sydney NSW 2001

Dear Professor Clark,

RE: MOUNT PLEASANT OPTIMISATION PROJECT – RESPONSE TO APPLICANT BRIEFING QUESTIONS

Thank you for the opportunity to brief the NSW Independent Planning Commission (IPC) in regard to the Mount Pleasant Optimisation Project (the Project) on 16 June 2022.

The IPC's letter dated 20 June 2022 requested further information regarding the following questions:

1. the target coal seams and associated gas contents;
2. the long-term stability of the final void; and
3. potential impacts on the Aboriginal cultural heritage site MTP-457.

Please find enclosed MACH Energy Australia Pty Ltd's (MACH's) response to question 1. Responses to questions 2 and 3 were provided via letter on 27 June 2022.

In the letter dated 16 June 2022, the IPC stated:

> ***GHG Emissions:***
> *1) Can the Applicant provide a table indicating by year of mine operation what seams are being targeted, including seam depth, thickness, gas content, methane percentage and sampling locations?*

Under a separate cover MACH Energy Australia Pty Ltd (MACH) has provided a **commercial-in-confidence** spreadsheet based on the Project Geological Model, that contains the following tables based on the Project mining rates and design:

- seam by year by thickness;
- seam by year by tonnes; and
- estimated fugitive emissions (in carbon dioxide equivalent [CO_2-e]) by year.

The Mount Pleasant Operation mines the multi-seam Wittingham Coal Measures. Due to complex seam splitting and coalescing across the mining domain and selective mining requirements, a large number of unique working sections are defined in the Geological Model.

In order to estimate fugitive emissions from open-cut coal mining in such a complex deposit, statistically valid gas sampling of the gas reservoir in the mining area is conducted. In support of this method, the Australian Coal Association Research Program (ACARP) published an industry guideline relevant to the measurement, estimation, and reporting of fugitive emissions from open-cut mines.

The National Greenhouse and Energy Reporting (NGER) Determination[1] now incorporates relevant parts of these ACARP Guidelines[2] including the requirement for a qualified Estimator to produce a statistically valid gas assignment model.

The Mount Pleasant Operation has an extensive gas sampling dataset which has been used to estimate potential Project fugitive emissions. The locations of the gas sampling boreholes are shown on Figure 1.

Gas content and composition values are calculated from the sample data on a depth basis, using an advanced statistical method (the SAS LOESS procedure). The result is a calculated gas content and gas composition for discrete depth intervals that then can be used to determine a representative CO_2-e value for use with the Geological Model.

Figure 2 shows gas content (cubic metres per tonne [m^3/t]) verses depth (metres [m]) and Figure 3 shows gas composition (CH_4:CO_2 Ratio) by depth at the Mount Pleasant Operation.

Figure 2 indicates that the Mount Pleasant Operation coal seams have relatively low gas contents (i.e. generally below four m^3/t within the open cut mine extents, and on average approximately one m^3/t), with relative gas content increasing with coal seam depth.

Figure 3 indicates that the measured methane content varies significantly at shallow depths, however, the methane content in coal seams approaches 100% of gas content at depths above approximately 200 m.

The CO_2-e value for each depth is multiplied by the total in-situ tonnes of a particular depth interval to estimate CO_2-e fugitive emissions for any given year of production. In accordance with the applicable methodology, the Project annual estimate is also inclusive of assumed losses of 50% of in-place gas from any coal seams located below, but within 20 m of the Project open cut floor due to depressurisation effects associated with open cut mining.

Both the relative volume of gas in coal, and the methane content of the gas increase with increasing coal seam depth at the Project (Figures 2 and 3). The technical feasibility of flaring of extracted gas is a complex interplay of gas content, gas composition and abandonment pressure. Where in-situ gas contents are below 3 m^3/t, the technical feasibility of gas drainage and subsequent flaring is more difficult to achieve.

[1] *National Greenhouse and Energy Reporting (Measurement) Determination 2008.*
[2] *ACARP C20005, Guidelines for the Implementation of NGER Method 2 and 3 for Open Cut Coal Mine Fugitive GHG Emissions Reporting, December 2011.*

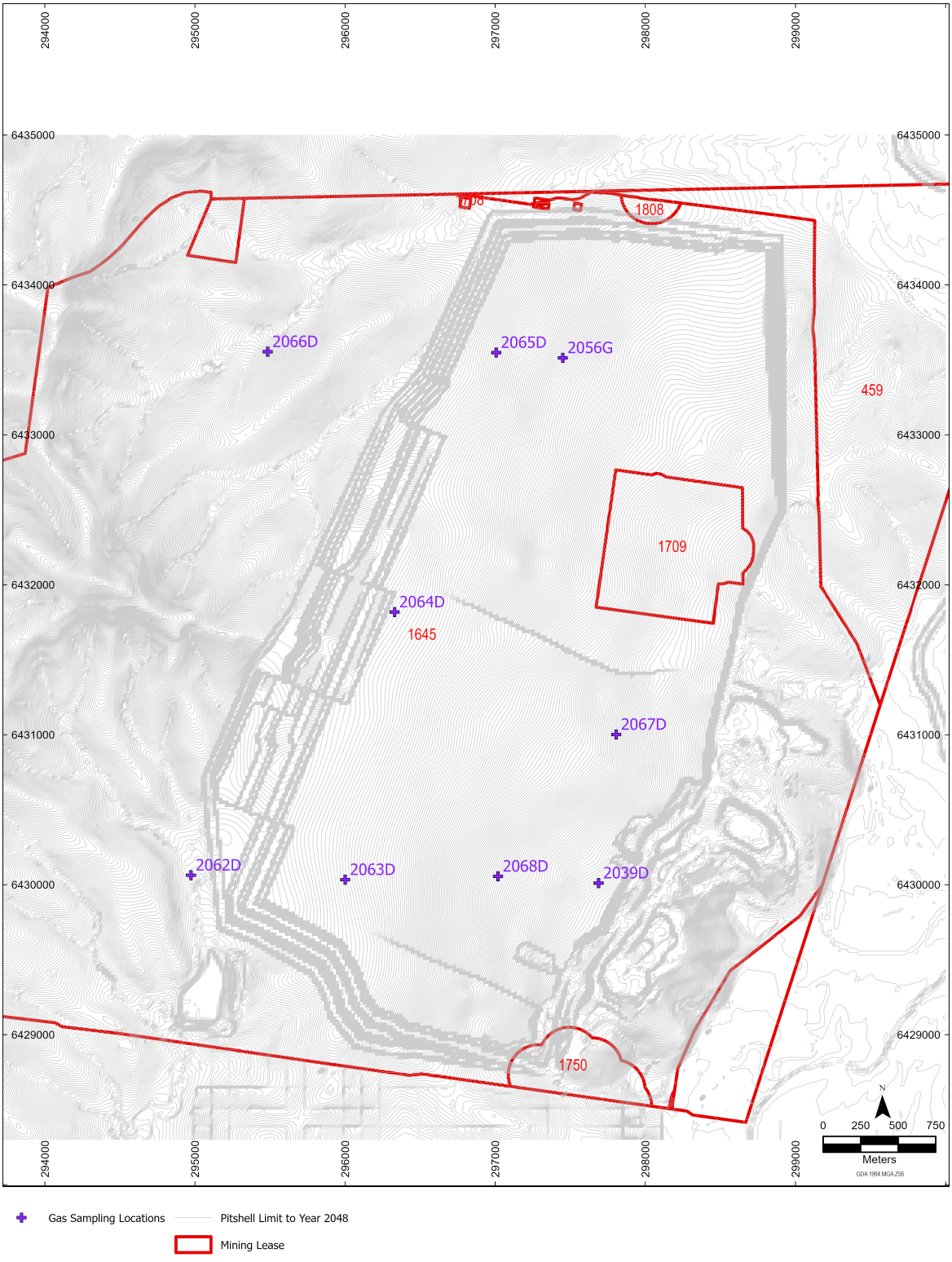

***Figure 1*: Locations of Gas Sampling Boreholes**

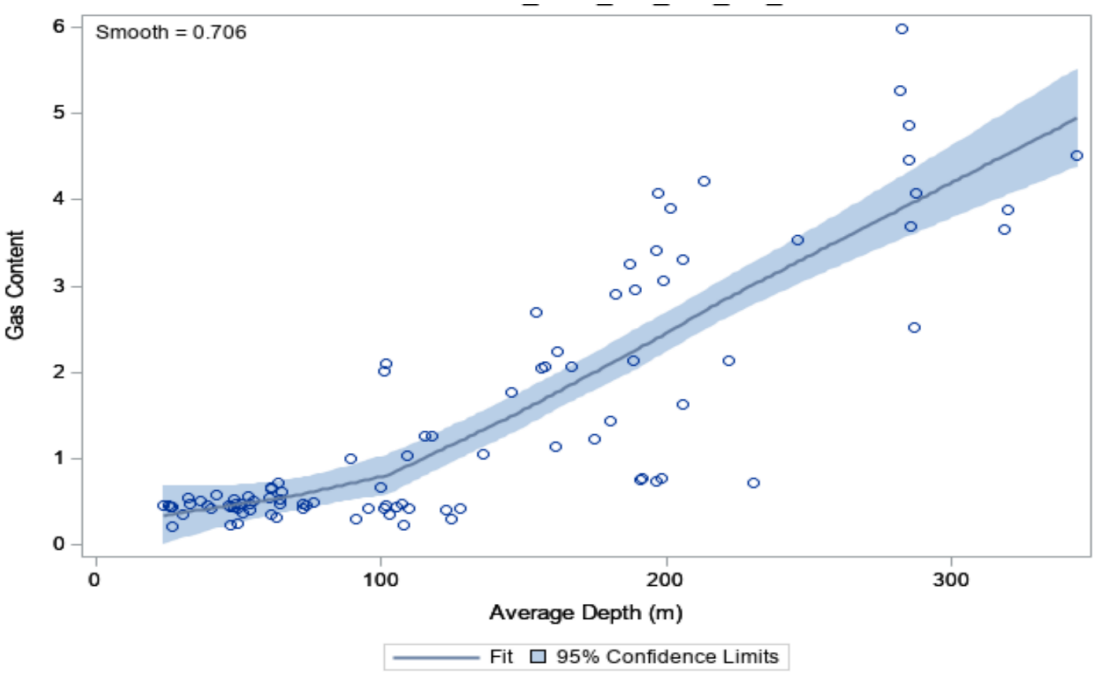

Figure 2: ***Gas Content (m^3/t) verses Depth Below Surface (m)***

Source: CoalBed, 2022

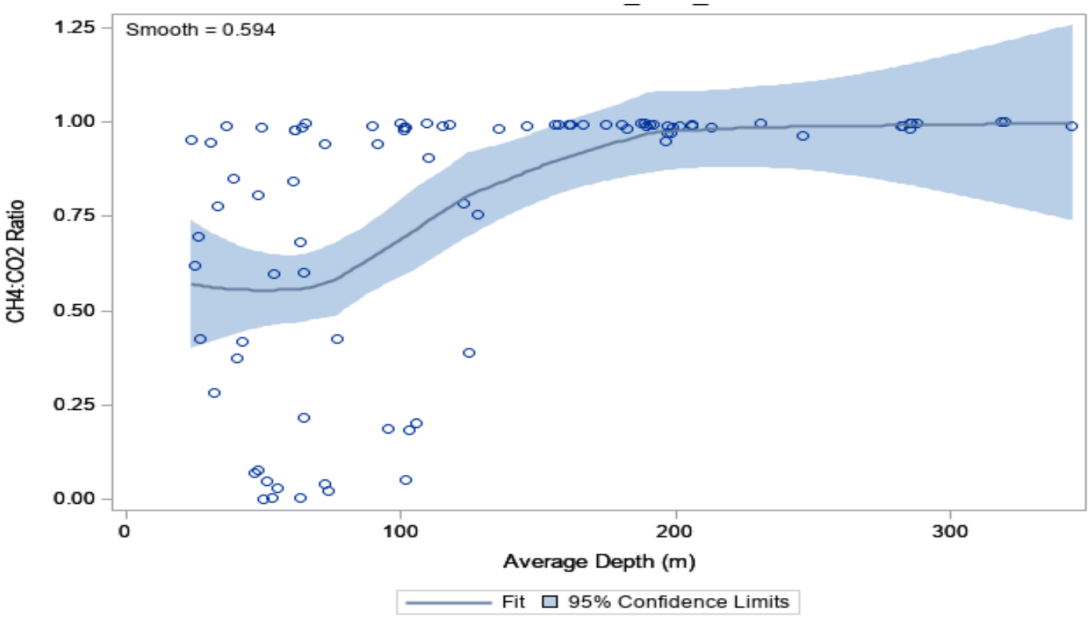

Figure 3: ***Gas Composition (CH_4:CO_2 Ratio) verses Depth Below Surface (m)***

Source: CoalBed, 2022

This in-situ gas zonation is also shown graphically on the cross-section on Figure 4. As evident on this conceptual diagram, locally more elevated methane contents above 3 m^3/t are primarily confined to the lower seams close to the 2048 Project highwall.

It is important to understand that the main driver for gas content and gas composition character, and hence the fugitive emission profile, is varying hydrological pressure. This can be seen conceptually on Figure 4, where the broad gas content zones observed in sampling are generally reflective of the depth from the land surface.

To estimate future fugitive emissions therefore requires gas desorption testing to determine a depth versus potential fugitive emissions profile, as has been undertaken at the Mount Pleasant Operation and illustrated on Figures 2 and 3.

To date, MACH is not aware of any open cut coal mine in Australia that has demonstrated an economically efficient method of conducting pre-drainage of coal seams in advance of a multi-seam open cut mine in such a low-gas multi-seam environment as is found at the Mount Pleasant Operation.

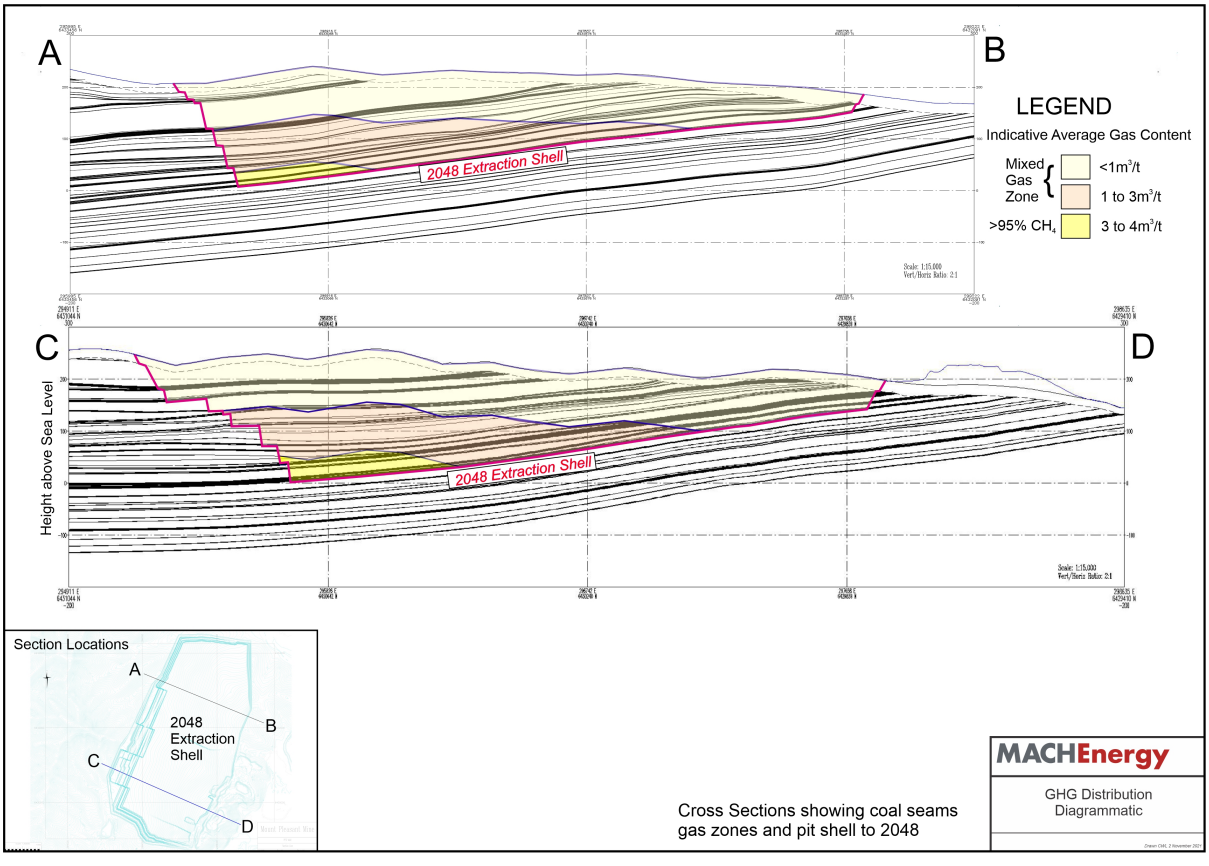

***Figure 4:* Conceptual Cross Section Illustrating Gas Content Distribution**

Notwithstanding, the majority of the estimated Project fugitive emissions would occur in the last 10-12 years of the Project life. Therefore, MACH would continue to periodically evaluate technological advancements in fugitive emission abatement technology and would implement additional reasonable and feasible fugitive greenhouse gas mitigation measures that may become available over the life of the Project.

MACH notes that the Department of Planning and Environment (DPE) has already proposed draft conditions for the Project that include Greenhouse Gas Performance Measures in Table 4, and the ongoing implementation of an Air Quality Management and Greenhouse Gas Plan inclusive of a requirement to periodically review available greenhouse gas abatement technologies:

> *B34. Within 12 months of approval of the Air Quality Management and Greenhouse Gas Plan and then every 3 years during the life of mining operations (and any period of suspension of ROM coal extraction and/or processing), the Air Quality and Greenhouse Gas Management Plan must be updated to include the following information in relation to Scope 1 and Scope 2 GHGEs:*
>
> *(a) a review of abatement technologies relevant to the development's GHGEs;*
>
> *(b) a detailed review of the feasibility of implementing various GHGE abatement options, and economic considerations for the development;*
>
> *(c) a 3-year action plan to investigate and implement reasonable and feasible measures to minimise GHGEs; and*
>
> *(d) a reporting of compliance with the performance measures in Table 4, and revise where reasonable and feasible to minimise GHGEs.*

MACH has agreed to this draft Consent Condition that requires periodic review and implementation of fugitive greenhouse gas mitigation measures that are determined to be reasonable and feasible for the Project.

If you require any further information on the matters discussed above, please contact the undersigned.

Yours sincerely,

Chris Lauritzen
General Manager Resources Development
MACH Energy Australia.