Independent Technical Peer Review – Air Quality Impact Assessment

Mount Pleasant Optimisation Project

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1 INTRODUCTION

The NSW Department of Planning and Environment (DPE) has engaged Zephyr Environmental (Zephyr) to provide a review of the responses prepared by Todoroski Air Sciences (TAS) to the technical review of the Air Quality Impact Assessment (AQIA) for the Mount Pleasant Optimisation Project (the Project).

In October 2021, Jane Barnett prepared an independent technical peer review of the TAS assessment for the DPE. At that time Jane was employed by ERM Australia (ERM) but has since moved to Zephyr. On 29 November 2021, Jane and DPE representatives attended a meeting with Philip Henschke of TAS and MACH Energy (MACH) representatives to discuss the outstanding issues in the peer review report.

On 22 December 2021, MACH provided the TAS response to DPE. This report provides further comment on the TAS responses. Sufficient information has now been provided to close out almost all issues. However, there are still some clarifications sought on the remaining issue.

The three main documents referenced in this report are:

- *Mount Pleasant Optimisation Project Air Quality Impact Assessment, prepared by Todoroski Air Sciences on 16 December 2020* (TAS, 2020)
- *Peer Review – Air Quality Impact Assessment, Mount Pleasant Optimisation Project, prepared by ERM on 11 October 2021* (ERM, 2021)
- *Response to Peer Review – Mount Pleasant Optimisation Project Air Quality Impact Assessment, prepared by Todoroski Air Sciences on 21 December 2021* (TAS, 2021)

2 ISSUES FROM REVIEW

The issues raised in the original peer review and the further work required was summarised in Table 3 of the ERM report (ERM, 2021). This is reproduced at Attachment A for reference, however each response and subsequent comment is addressed in this section.

Issue 1: No discussion of new NEPM standards for $PM_{2.5}$ and NO_2

The point of this comment was not to use these new NEPM standards in lieu of impact assessment criteria, but rather to acknowledge them in the context of the predictions. We are aware that the NEPM came into force after the completion of the AQIA, however, they have been in the public domain in draft form for some time and so recognition of this in the assessment would be useful for context. Inclusion of these, even noting that they were in draft form, would have made for a more robust assessment. However, the issue is considered minor and despite TAS declining to note these potential future reductions it is now **closed**.

Issue 2: Clarification of peak activities

This information has now been provided and I am satisfied that the appropriate mining years have been assessed. The issue is **closed**.

Issue 3: Inclusion of pit terrain in the CALMET model

TAS has confirmed that variations in mine plan terrain were included in the CALMET model for each scenario. This issue is **closed**.

Issue 4: Inclusion of five-year analysis of Muswellbrook meteorology

The TAS response (TAS, 2021) provides a multi-year analysis for Muswellbrook, using the same methodology that was used for Scone in Appendix B of the AQIA (TAS, 2020). This was not presented in the original assessment but has now been completed and shows that 2015 is likely to be a representative year, in terms of meteorology, for Muswellbrook.

This issue is now **closed**.

Issue 5: Details on weightings and scores for representative analysis

TAS has provided further information regarding this methodology. This issue is now **closed**.

Issue 6: Representativeness of 2015 in relation to air quality

The TAS response (TAS, 2021) refers to 2015 being representative with respect to meteorology. I am satisfied that 2015 is representative in this sense. My concern was that this was not the case for ambient dust concentrations as demonstrated by the monitoring data. Further detail now provided on the 2012 – 2015 analysis satisfies this concern. This issue is now **closed**.

Issue 7: Deviation from Approved Methods requires justification

Despite the TAS response to the contrary, the methodology presented in the AQIA (TAS, 2020) is in fact a deviation from the Approved Methods. However, the new information provided for PM_{10} has enabled a more detailed review and given the significant difficulties in estimating what the residual background concentrations would be in an environment such as the Hunter Valley, this methodology is considered adequate. This issue is now **closed**.

Issue 8: Provision of spatially varying data

TAS has provided a partial response to this issue. Attachment 1 of the TAS response (TAS 2021) presents a table of information but does not provide the final data used to calculate the grid presented in Figure 6-10 of the AQIA. For example, there are no co-ordinates provided for the Monitor IDs, nor the final value representative of the 2012-2015 period used to form the varying grid. This could be done simply by providing a spreadsheet with the relevant columns of information (X co-ordinate, Y co-ordinate, derived annual average PM_{10} and TSP concentration at each monitor). The assumed values at the domain boundary and their relative co-ordinates should also be provided. This would enable us to replicate the varying grid and confirm it is correct. To provide clarity, confirmation is also required as to which statistic (maximum, mean, median etc.) is used to calculate the representative value using the 2012-2015 data.

This issue remains **open** until the information required to reproduce the contour can be provided. This information is important as it forms the basis for the annual PM_{10} background concentrations and is therefore critical in the assessment of cumulative impacts.

Issue 9: Justification for the use of $PM_{2.5}$ background concentration value

TAS has now clarified that the 2.9 µg/m^3 concentration is not presented as a representation of background air quality in the absence of mining (TAS, 2021). Rather, it is the 'residual' once mine-related modelling is subtracted from ambient $PM_{2.5}$ monitoring data for the year 2012. The unrealistically low value presented is explained as being due to an anticipated over-prediction within the modelling. On this basis, the value presented can neither be expected to be representative of background, nor static over time. That is, it will be a function of meteorology, monitoring and mine planning for a given year.

The assumption that the "other mines" contribution will continue to increase and therefore the residual background is conservative, is unsupported. Reliance upon monitoring and modelling outputs that are now a decade old for this parameter is not considered a valid approach.

However, given that the critical parameter for impacts and acquisition rights is likely to be PM_{10}, not $PM_{2.5}$, and also for 24-hour averaging periods rather than annual averages, it is acknowledged that a more robust assessment approach is unlikely to change the ultimate outcomes of the assessment.

In summary, the methodology for assigning the residual background for annual average $PM_{2.5}$ is not considered appropriate. However, as this is unlikely to result in a change to the main assessment outcomes, this issue is now **closed**.

Issue 10: Background NO_X values and cumulative NO_2 method

If 100% conversion from NO_X to NO_2 has been assumed, then this is a suitably conservative approach. This was not explicitly stated in the report, so it was not possible to confirm during the initial review. This issue is now **closed**.

Issue 11: Future dragline emissions

Further detail was provided just prior to the 29 November 2021 meeting and after the ERM report was completed which satisfied this query. This issue is now **closed**.

Issue 12: Justification for 90% control on haul roads

TAS has responded to this request for justification with references to reports which are not publicly available. On request, Zephyr was advised these reports would not be provided.

TAS has since provided a summary of the methodologies used to obtain the high values of over 90% control on the haul road. While not explicitly stated in the information provided (and in the absence of the full report), the assumption is that this level of 90% can be achieved by watering alone, that is, in the absence of chemical dust suppressants.

This issue can be **closed**. However, it is highly recommended that evidence be provided to support the claim that 90% control can be achieved through watering alone.

Issue 13: Justification for low silt content used

The silt content assumed for the haul roads at Mount Pleasant is low and no site-specific evidence to substantiate this claim is presented in either the AQIA or the TAS response to peer review comments. Currently, the claim is based on the statement, "the silt content adopted in the AQIA is considered representative of the site".

Work done in 2015 for the Australian Coal Association Research Program (ACARP) undertook measurements from 44 different haul roads on open cut coal mines and notes significant variability between sites and also across the same site (*ACARP Project C22027 – Development of Australia-Specific PM_{10} Emission Factors for Coal Mines, prepared by Pacific Environment, 21 September 2015*). The TAS response quotes the ACARP study, but only notes one site (Mt Arthur) in Table 5 of its report (TAS, 2021). There are five other sites noted in the ACARP study where direct haul road silt content measurements were made (Rix's Creek, Wambo, Ravensworth, Liddell and Tarrawonga). In total, there were 44 haul road samples taken across six sites. Direct silt content measurements were also made across numerous mine sites during the NSW EPA Dust Stop Program in 2012-2013. Adding these to the database brings the total to 72 haul road silt samples.

Figure 1 presents a summary of these measurements, as well as the additional seven values measured at Bengalla Mine and presented in Table 5 of the TAS response report (a total of 79 direct

measurements). The measurements are ranked from lowest to highest in Figure 1, which also notes the data average (4.8%) and the median (4.3%), as well as the 2% value used in the AQIA for comparison.

Clearly there is significant variability, but to propose that 2% is representative without demonstrating this through direct measurements is not supported.

Additional analysis by TAS (TAS, 2021) shows that an increase in silt content from 2% to 3% (still below the average and median) would result in more dust at the source (up to 11% increase in TSP). However, dispersion modelling has demonstrated that this increase does not necessarily translate into a significant increase in predicted concentrations at the nearest, previously unimpacted, receptors. The report also notes that the silt content would need to be of the order of 7-8% to result in an additional exceedance. While it may be unlikely that haul road silt contents are this high, Figure 1 shows this is not impossible as 20% of the measurements in the existing database are above 7%.

This issue can be **closed**. However, given the variability shown in values both between sites and within the same site, it is highly recommended that site specific silt contents be measured on a variety of haul roads to support the claim that this low value of 2% can be achieved. This was recommended in the original peer review (ERM, 2021) and again at the meeting on 29 November 2021. Our position has not changed.

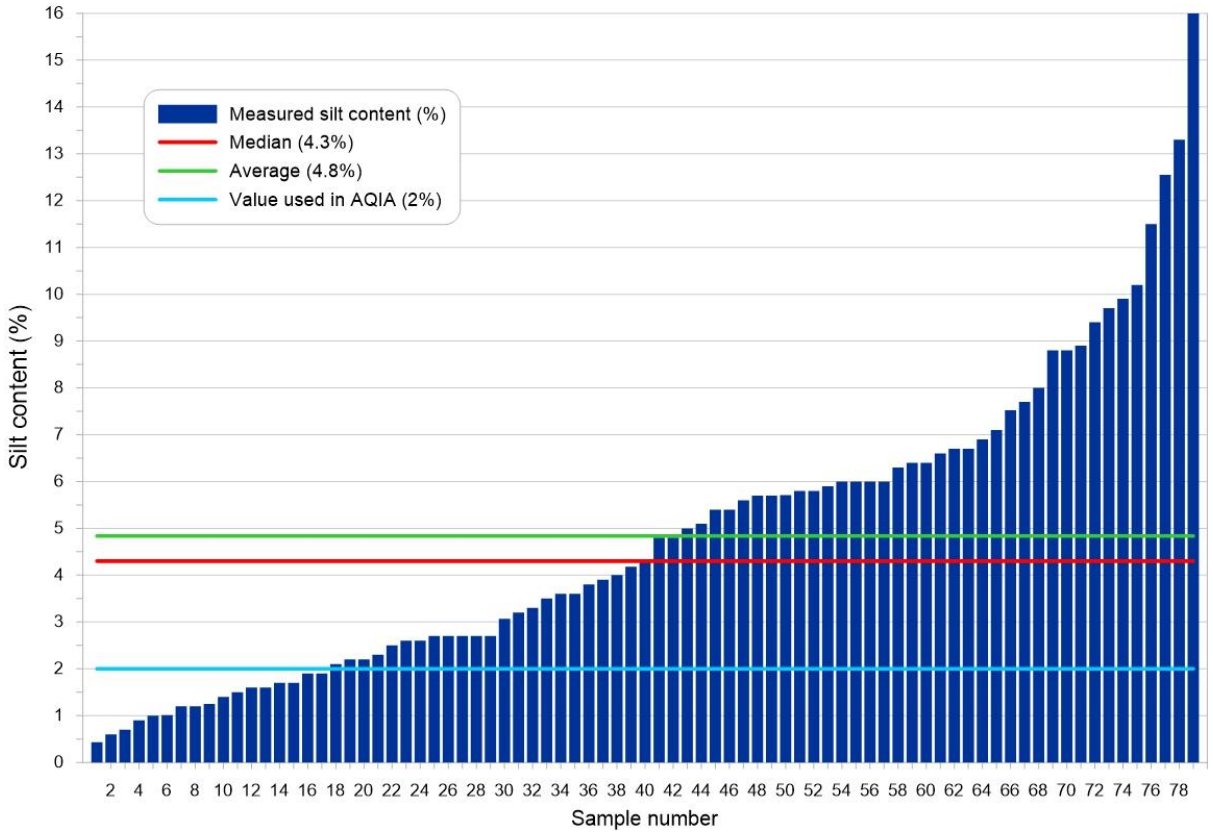

Figure 1: On-site measurements of unsealed haul road silt content

3 CONCLUSION

In summary, the majority of issues are now considered closed as TAS has now provided additional information missing from the original assessment. However, there is one piece of information which remains outstanding:

1. The data used to produce the spatially varying background grid (Figure 6-10 in the AQIA) used for the PM_{10} assessment needs to be provided so the grid can be reproduced. This needs to include the X and Y co-ordinates and derived PM_{10} concentration for each data point (including the points on the grid boundary). TAS also needs to confirm which statistic was used to derive this PM_{10} concentration from the 2012-2015 data.

As noted previously, this is important information as it forms the basis for the background concentrations and so is critical in the cumulative assessment. If this grid can be replicated with the information requested, then I am satisfied the predictions made in the assessment are reasonable.

Additionally, there are two important inputs that remain unsupported through site-specific evidence. As these inputs are critical for determining the emissions from one of the most significant sources, wheel generated dust, it is recommended that some monitoring be conducted to confirm:

1. the ability to achieve a 90% control efficiency through the application of water alone
2. silt content of 2% will be achieved on the main haul roads

Please contact the undersigned if there are any further questions.

Kind regards

Jane Barnett
Principal – Air Quality
Zephyr Environmental

Zephyr Environmental

Attachment A

Issues and further work required noted in the original ERM peer review (ERM, 2021)

Reproduced from Table 3 in the ERM review report

Area	Issue	Significance	Action required
Air quality criteria	No mention of new NEPM standards	Minor	Discussion of new NEPM standards for $PM_{2.5}$ and NO_2 and comparison to predictions.
Selection of model scenarios	Clarification of peak activities	Minor	Presentation of annual waste and ROM production volumes for the life of the project, in graphical or tabular form, to ensure worst-case years have been evaluated.
Meteorological modelling	Inclusion of pit terrain in CALMET	Response / Additional Analysis required	Clarification of whether pit terrain has been incorporated into the CALMET model for each year. If not, then justification provided as to why not.
Representative year – meteorology	5-year analysis at Muswellbrook	Minor	A 5 year analysis of meteorological data from Muswellbrook should be carried out to confirm 2015 is representative in the Project area.
	Weightings	Response / Additional Analysis required	Provide details on how the weightings and scores were assigned for each parameter, and justify why the $PM_{2.5}$ and PM_{10} weightings are different.
Representative year – air quality	Use of 2015	Response / Additional Analysis required	Evidence presented in this report and also the AQIA, suggests that 2015 it is not a representative year with respect to air quality. Further justification is needed as to why this year was deemed representative when it demonstrates consistently lower PM_{10} and $PM_{2.5}$ concentrations than other years.
Background values	Deviation from the Approved Methods	Response / Additional Analysis required	When deviating from the Approved Methods, detailed justification is required for doing so. Provide a detailed description of how each background value was determined, including all assumptions, so it can be verified (see below).
	Lack of detail on how the varying map for PM_{10} was produced	Response / Additional Analysis required	Provide the values used to calculate the spatially varying map and details on how these were determined, including boundary conditions and data and assumptions used. Provide details (a worked example or flow chart) of how this was applied to the cumulative assessment.
	Background estimates for annual $PM_{2.5}$ are unrealistic	Response / Additional Analysis required	Clear and full justification for the use of 2.9 $\mu g/m^3$ and 5.4 $\mu g/m^3$ for the background value for annual average $PM_{2.5}$, and why this is considered representative. This needs to demonstrate how monitoring data were used to determine these values, and not just a reference to a previous report.
	NO_2	Minor	Detail should be provided as to what background NO_X and NO_2 values were used and how cumulative NO_2 values were calculated to provide the contours in Appendix H of the AQIA.
Emissions estimation	Dragline emissions	Response / Additional Analysis required	If draglines are to be used in the future then further investigation should be done to include these emissions in the inventories and modelling to ensure the outcomes of the assessment do not change.
	90% control on some haul roads	Response / Additional Analysis required	Justification for this level of control should be provided and should be site specific. This is a high level of control for only Level 2 watering and evidence is required to justify this assumption.
	Silt content on haul roads	Response / Additional Analysis required	Site specific investigations should be carried out on a number of different types of haul roads to ensure that 2% silt content is representative of the site. If this is higher then the inventories need to be recalculated and additional modelling may need to be carried out to understand if this changes the assessment outcome for any sensitive receptors.