1 April 2021

ERM Reference: 0594627

Subject: Independent Peer Review – Kariong Sand and Soil Supplies Air Quality Assessment

ERM has been engaged by Davis Earthmoving & Quarrying Pty Ltd to provide an independent technical peer review of the air quality assessment work carried out for the Kariong Sand and Soil Supplies project (the Project).

There are a number of documents ERM has reviewed and these include:

- Kariong Sand and Soil Supplies Air Quality Impact Assessment. Reference 18.1021.FR2V4 prepared by Northstar Air Quality on 30 June 2020
- Peer Review of the Kariong Sand and Soil Supplies Air Quality Impact Assessment. Prepared by Todoroski Air Sciences (TAS) on 22 September 2020
- Addendum to the Kariong Sand and Soil Supplies Air Quality Impact Assessment – Response to Submissions. Reference 18.1021.L2V4 prepared by Northstar Air Quality on 10 December 2020
- Peer Review of the Addendum to the Kariong Sand and Soil Supplies Air Quality Impact Assessment – Response to Submissions, prepared on 11 March 2021
- Letter in response to the Peer Review of the Addendum. Reference 18.1021.L2V4 prepared by Northstar Air Quality on 1 April 2021

With over 25 years' experience in air quality modelling, emissions estimation and assessment, I have read and understood the documents listed above and am qualified to provide this review.

There has been a significant amount of analysis carried out, and much of this has also been reviewed by the NSW EPA. I am satisfied with the conclusions drawn in the assessment that the operation of the Project is very unlikely to result in any changes to air quality that would result in offsite adverse impacts. In fact, with the significant mitigation measures and monitoring proposed this will be even more unlikely to result in any offsite impacts.

There are a number of issues that appear to have been discussed at great length by both parties, and this letter provides my opinion on these issues.

Modelling approach and meteorological data

The dispersion model AERMOD used for the assessment is entirely appropriate for this type of assessment. It has its limitations, like any model, but is a reasonable and appropriate model for representing ground based, non-buoyant sources such as those modelled for this Project. It has been used in numerous assessments in NSW for dust generating industries such as quarries, concrete batching plants and recycling facilities and is accepted by the EPA.

With regard to the meteorological data used, the uncertainties around this are acknowledged by both Northstar and the EPA. A number of sensitivity tests were carried out to try and adequately validate the model against the observation data recorded at Gosford AWS. As none of these were successful an alternative method was suggested, which was to apply the observed data at Gosford to the Project.

Obviously this is not ideal, as noted by Northstar, but without any other data this was the approach taken and the uncertainties noted. This method was deemed acceptable by the EPA as these uncertainties were reduced through a commitment to carry out significant mitigation measures such as enclosing processing activities on the site. The proponent has also committed to installing a meteorological station to collect site specific measurements and which will remove the remaining uncertainty with regard to the representativeness of the local meteorology.

It is noted that the TAS review provided a CALMET extract which it claimed was *"likely more representative of the project site"*. However, without any evidence to validate that this is any more representative than any other dataset, this claim cannot be substantiated.

There is no doubt uncertainty around the local meteorology, however the proposed mitigation, proactive and reactive management through TARPs (Trigger Action Response Plans) and the commitment to measure site specific data, these uncertainties will be managed. This approach is accepted by the EPA.

Emission estimates

In my opinion, the emissions have been calculated using the appropriate methodologies and assumptions. In fact, with the increased emissions presented in the Addendum, these are likely to be conservative.

It is noted that the TAS review appears to suggest there is a direct linear relationship between emissions and impacts at receptors. In other words, a doubling of emissions from one source, will result in a doubling of impacts at a receptor. This is not necessarily the case for dust sources because some are related to the wind speeds at the time of emission. For example, a doubling of an area subject to wind erosion, will not necessarily lead to a doubling of the impact at a receptor. These emissions are dependent on wind speed within the model. The higher the wind speed the greater the potential emission, but these higher wind speeds lead to better dispersion conditions and so this does not always translate to higher impacts at those times.

The emission factors that TAS has suggested for silt loadings on roads are extremely high and unlikely to be realistic for this site. Even so, the value of 8.2 g/m^2 which is still high in my opinion, was used in the latest Northstar modelling and has not resulted in impacts. Also, the control factors used in the Northstar report are appropriate and applied correctly.

There is some lengthy discussion around the movement of front end loaders on the site and this emission not being considered. The loading and unloading emissions have been considered appropriately, and these emission factors will incorporate to some extent the movement of the vehicle as it moves to pick up and drop these loads. However, it is not my experience that additional consideration needs to be made for the travel distances. I have carried out numerous emissions estimation and modelling studies for quarries and mines in NSW over 20 years and have never specifically accounted for this particular source. It is my opinion that no further assessment of this source is necessary.

The TAS review makes comments regarding the site layout and design, but does not appear to consider the main function of the operation. Furthermore, the comments regarding the crossing of 'clean and dirty' travel paths causing excessive contamination and track out are generalisations and suppositions rather than evidence. These comments are misleading in light of the considerable lengths the proponent has gone to mitigate emissions at the source.

Regardless, the mitigation measures proposed for the site (both proactive and reactive) are significant and are likely to result in lower emissions than those actually modelled and I do not agree with the TAS conclusion that the emissions remain significantly underestimated. In my experience, the measures proposed appear to go to above and beyond what an operation of this nature would generally undertake, and represent best practice.

Modelled receptors

Northstar has provided additional model results for the new receptor which show no exceedances of the criterion.

Background data

The Wyong monitoring data used to represent existing background concentrations is entirely adequate for this purpose. There is no evidence provided to suggest that this station may underestimate the conditions at the Project site. Indeed, it may overestimate. The purpose of the monitoring data is to present background conditions which may be reasonable to assume occur in the ambient air. The suggestion by the TAS review that these background data somehow be manipulated or adjusted is also concerning and is not an approach that would likely be acceptable to the EPA.

Regardless, the proponent has committed to air quality monitoring prior to the construction and operation of the facility and so this point is moot.

Cumulative impacts

The TAS review is incorrect to suggest that the impacts due to wind erosion should be additive for those receptors in between the Project and the nearby quarry. Firstly, as discussed previously, the increases in emissions and the resulting impacts at receptors are not necessarily linearly related. Secondly, and perhaps more importantly, receptors in between two sources cannot be impacted by those two sources at the same time. I agree that the winds can change within a 24-hour period, and therefore blow towards different receptors, but they cannot blow towards those receptors at the same time.

Again, and regardless, the proponent has committed to air quality monitoring prior to the construction and operation of the facility and so the contribution of the quarry can be quantified and so this point is moot.

Summary

In summary, it is apparent that this will be a well managed site, with best practice mitigation measures in place to ensure emissions are kept to a minimum. Emission estimates are reasonable in my opinion and have applied appropriate controls where relevant.

The monitoring data used to represent the background conditions at the site are appropriate. Furthermore, there is also commitment to monitor background concentrations and meteorology which will remove the potential uncertainties around these data inputs in the modelling.

Finally, the predictions made using accepted modelling methodology, appropriately conservative emission estimates and representative background data, show that there are no adverse impacts expected at nearby receptors due to the Project.

Yours sincerely,

Jane Barnett
Partner – Air Quality