

Submission to Planning Assessment Commission
From
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[REDACTED]

I presented a technical summary of the noise emanating from Gunlake Quarry (GLQ) on the 31st January at the Marulan Hall. In this submission I wish to detail how the results and their conclusions were reached. I shall omit the mathematical detail for simplicity in argument but am more than happy to provide these details if necessary. References to technical and standard literature will hopefully suffice to strengthen my argument without the boring details, which would distract from the important information leading to my conclusions that I did not get to properly summarise in the PowerPoint presentation.

Deficiencies in the EMM Noise Report.

Following the Assessment and Recommendation from the Department of Planning and Environment (DPE), I find serious deficiencies in the Noise evidence presented to the DPE, and DPE's unquestioning reliance on that data and predictions from the EMM consultants.

1. The majority of equipment sound power levels were determined from on site noise measurements.

This is clearly not the case. From Table 5.1, p28 [1], only 9/20 (present infrastructure) or 13/25 (future upgraded items) operational plant/equipment items were actually measured in September 2016.

Why were not repeated measurements done to define proper error bars on the sound footprint of the power source on site?

At worst they were "on-site" determinations taken in very different conditions of the machinery in different years. That methodology is unacceptable.

2. Where direct measurement was not possible, sound power data has been obtained from previous site surveys when the site was fully operational (Pacific Environment 2014) or from EMM's sound power database.

This is an incomplete analysis, particularly with older well-used items equipment not being measured for sound power levels on the same site visit taken on 2 September 2016.

Why were not repeated measurements done to define proper error bars on the sound footprint of the power source on site?

If it took too long in time to take 21—25 individual sound power measurements for such an important development with equally important impacts for the local and greater communities, why was not more care and attention shown to the Scientific Method?

This is an initial example of negligent practice repeated more often than not in EMM's analysis.

3. The noise modelling conservatively assumed that all plant and equipment operate concurrently.

This is scientifically inconsistent at best without any attempt to compare theoretical/modelling data with acceptable measured experimental data obtained for the Sound Level Meter.

4. The predicted operational noise levels for the current operations and the proposed extension project are summarised as follows:

4.1 No or negligible impacts (noise levels 0 to 2 dB above PSNLs) are predicted for the current operations at R5, R6, R7 and R8.

4.2 No or negligible impacts (noise levels 0 to 2 dB above PSNLs) and predicted for the extension project operations at R5, R6 and R8.

4.3 Moderate impacts (noise levels 3 to 5 dB above PSNLs) are predicted for the current operations at R2 and R4. These locations would be entitled to mitigation in accordance with the VLAMP.

4.4 Moderate impacts (noise levels 3 to 5 dB above PSNLs) are predicted for the extension project operations at R7. These locations would be entitled to mitigation in accordance with the VLAMP.

4.5 Significant impacts (noise levels >5 dB above PSNLs) are predicted for the extension project operations at R2 and R4. These locations would be entitled to mitigation and voluntary acquisition upon request in accordance with the VLAMP.

4.6 The noise levels that are above the criteria are mainly as a result of noise emissions from the quarry processing plant. Notwithstanding, noise levels from the extension project would be lower at receivers further away from the quarry (in particular the processing area). Noise levels at these further away receivers are predicted to satisfy the criteria during worst case meteorological conditions for all stages of the project.

If on-site reduction in sound power levels were taken for all noisy items of equipment, as is being proposed for the Primary Crusher (PC), then these excesses noted above would be significantly reduced. In fact the agreed-to noise levels at R2 and R4 effectively move all other residences closer to the plant footprint by an estimated 40% in distance.

The correctness of the predicting offered by the model should be tested and it has not. DPE relies heavily on these predictions in their assessment report and they too have not verified the validity independently. In fact, in the DPE Assessment report the noise section belies its total reliance on the strength of the EMM model and its unsubstantiated predictive correctness. I counted the adjective “projected” 30 times in the DPE assessment papers: this occurrence demonstrates the complete influence of the EMM Noise report, and thus Gunlake,

on the decision making process of the DPE in its assessment of the proposal.

The statistical significance of the “predicted noise levels” in the difference range (0, 2) being labelled negligible and (3, 5) and beyond for a 35dB(A) weighting need to be evaluated in the reference of their periodicity/occurrence and repeatability. Any predicted noise power reading above 3 times the standard deviation (error of 1dB(A)) of the required 35 dB(A) reference level is statistically significant. Readings above 5 times the error are scientifically wrong in the sense that these readings or predictions are truly different from the base of 35 dB(A). These terms “negligible, moderate and significant” are not acceptable in a scientific approach. Simply apply the Student’s T test here for the validation of the significance of the level of confidence for those outlying readings. It is not the usual outlying numbers in a distribution of numbers but rather a test about how close a definite number(the 35 base) and other measurements can be “away from that mean”.

4. The modelling includes existing and proposed operations at the quarry.

From Table 5.1, p 28 [1], the loudest noise power source is an active loading of the FELs to trucks and the Primary Crusher.

5. EMM conducted a site visit on 2 September 2015 to undertake noise measurements at Gunlake Quarry for the purpose of determining sound power levels of relevant equipment items. It is noted that it was not possible to effectively measure all on site equipment as some equipment was not operating on the day of monitoring. Where direct measurement was not possible, sound power data has been obtained from previous site surveys when the site was fully operational (Pacific Environment 2014) or from EMM’s sound power database. Sound power data adopted for each noise modelling scenario is provided in Table 5.1. The noise modelling conservatively assumed that all plant and equipment will be operating concurrently.

It is astounding that not all equipment was working on the site during the visit. Are the upgraded equipment proposed for the processing plant on site during the visit and working? They are three new pieces of equipment that operate at 118 dB(A), clearly in excess of the 112 dB(A) measure for the primary crusher.

It appears that not all pieces of equipment and plant are actually operating as detailed in this table. In particular see details below about the Front End Loader (FEL) night operations. This/these unidentified machine/machines “measured” at 115dB(A) in the table yet realistically worked at a higher 124 dB(A). Does that imply that error bars of 1dB(A) often quoted in the document are significantly out to 9 or even above? Was the primary crusher actually processing rock during the 2016 site visit? Were the upgraded tertiary crusher and two impact crushers fully operational or simply powered up? These are significant questions that the report does not clearly address. The impacts of these details are extremely important and need clarification by an independent expert.

6. During the site visit, it was identified that the noise sources most likely to cause sleep disturbance were from the FEL loading the road trucks and the haul trucks

unloading material into the Primary crusher bin. The maximum noise level from a haul truck unloading material into the hopper bin measured by EMM was L_{Amax} 124 dB. This L_{Amax} noise level was used as input to the computer model for both maximum noise level events (FEL operation or haul trucks unloading material).

Firstly, why is it necessary to operate this machinery 24 hours per day? I estimate that simple scheduling during an 8-hour day would allow processing of 2 Mt/yr from the hours being used today for processing an estimated 0.55 to 0.65 Mt/yr.

Secondly, the expected noise levels associated with these loading operations are predicted for some residences whose noise levels are not actually measured. The predictive powers of the model are questionable at best.

My own measurements would indicate the EMM predictions at far-field sites are simply wrong. See point 11 for further details. That discrepancy points once more to the model's having to be renormalised to agree with actual measurements in the far-field zone, outside the onsite and midfield zones.

7. The noise model was calibrated accordingly to reflect the difference in measured and modelled noise levels. Quarry noise levels measured both on site and off site during attended measurements were similar to levels calculated from the calibration model, and differences in levels were in the order of ± 1 dB. The existing and future noise level predictions presented in Table 5.1 are therefore considered accurate in representing noise from Gunlake Quarry operations.

Why was it necessary to calibrate the model so often? If the model was not in agreement with the experimental data (which I accept), it should not need renormalization. That model should be discarded and replaced completely according to the Scientific Model. If the corrected model now works for on- and near-site readings (in agreeing with the meter's data), that does not imply any worthiness about its predictive ability for future equipment and for far-field estimates. Again my own measurements significantly disagree with EMM's predictions of 35 ± 1 dB(A). There is scientific evidence supporting my approach.

8. This satisfies the current project approval limit and adopted criterion at this location. The highest predicted L_{Amax} noise levels at all other assessment locations (R4 to R8) ranged between 36 dB and 43 dB during F class temperature inversion, and satisfy the EPA's strict background plus 15 dB screening target.

I must reiterate that if the noise agreement between GL and R2 were to realign with the DPE 35 dB(A) 24 hour guide lines, all other residences would not be effectively 40% closer to the plant noise sources. Further on-site moderation of all noise sources greater than 110 dB(A) would resolve this problem for all residences, near and far.

9. The L_{Aeq,period} noise contour derived from all five modelled operational stages for worst case meteorological conditions is presented in Figure 5.1. The

night time noise contour has been provided as this represents the worst case operating period. Only the subject site's contribution is included and the LAeq,period 45 dB contour is shown (ie equivalent to the VLAMP night time 25% land acquisition criterion). As discussed earlier, night time operations from other operations would not alter this level (ie Johnniefields Quarry does not operate at night and Lynwood Quarry is documented to contribute at less than 30 dB).

The surrounding quarries use very effective shielding of most, if not all, processing equipment. If Holcim operates Lynwood at 35 dB(A) on-site and consequently off-site measurements read at 30dB(A), why cannot GL adopt similar practices? In quantitative terms, if GL proposes to produce 2Mt/yr compared to Holcim/Lynwood's present 2.5 Mt/yr, GL should be building its associated infrastructure to $2/2.5 \times 120 \text{ M\$} = 96 \text{ M\$}$. If this is not viable then the proposed development is not viable.

10. A review of noise monitoring reports for the previous three years found that noise emissions from the quarry are typically inaudible at the nearest residential locations or, if they are audible, are below the relevant noise limits.

From the DPE assessment paper:

“The current project approval for Gunlake Quarry contains noise criteria for two properties, R2 east of the quarry and R4 west of the quarry of 35 dB(A)Lea(15min) for the day, night and evening periods. As shown in Table 6, the Noise Assessment predicts that noise from existing operations would be exceeding the current noise criteria for R2 and R4. The Department has asked Gunlake to supply records of its noise monitoring. Having reviewed these records, the Department considers the noise monitoring undertaken over the past three years is inadequate and also notes that Gunlake has not been reporting its monitoring results in accordance with the requirements of its current project approval. This matter has been referred to the Department’s Compliance Branch for further investigation. “

These records are incomplete. This statement in item 10 above is clearly false. Noise levels in excess of the so-called predicted 35 dB(A) at our place are routinely encountered.

11. To evaluate the environmental noise performance of Gunlake Quarry, it is recommended that the noise monitoring program is continued and includes night time noise monitoring to quantify the 24 hours operation of the processing plant.

The noise-monitoring program needs to be significantly improved and GL fined accordingly under the Compliance provisions.

12. Operational noise levels at assessment location R7 from the proposed extension project are predicted to moderately exceed (by 3 dB, ie between 3 to 5 dB) the

current project approval limits and PSNLs during worst case meteorological conditions.

I would argue the predictive analysis needs to be verified by an independent expert. The range of 3-5 dB(A)'s is statistically significant and indicates the noise power level is truly in excess of the 35 dB(A) requirement asked for by the PDE and so unacceptable by the INA. Unless the error bars are not what are indicated in the model.

13. The noise benefit from adding sheet metal enclosures around the existing and upgraded processing plant and equipment was also reviewed. The overall reduction in total offsite noise levels with this mitigation in place was in the order of 4 to 5 dB at R2, R4 and R7. This reduction was evaluated along with other economic and social factors and was deemed unreasonable for the project due to:

- the reduction is of most benefit to two assessment locations, and of moderate benefit to a further one assessment location;
- the significant overall cost to implement the measure along with ongoing maintenance restrictions would potentially deem the project economically unfeasible; and
- entering into an amenity agreement, or, offering voluntary acquisition rights for two locations and voluntary mitigation rights for one location would likely present a more economically sustainable outcome for the project.

All noise level reductions at these sites would ensure the propagating noise for all residences would be reduced. A set of acoustic reducing enclosures, not just sheds, is the correct and acceptable path for our environment. The “economically sustainable outcome” for GL is not the issue here. The “E” in DPE is an abbreviation for Environment not Economics.

14. The noise contours for the worst case meteorological conditions (Figure 5.5) show that there are no residences within the 35 dB LAeq(15min) PSNL that were not assessed and hence that appropriate sensitive receiver locations were selected.

An independent expert should assess my own residence immediately. There are other residences facing the same dilemma and exposed to 35+ dB(A) levels from GL. Again this is evidence that the 35 and 45 contours are incorrect as are predictions from the so-called model.

I have measured the noise level in excess of 48 dBA over 15 minute periods of monitoring many times, even in atmospheric conditions that are not temperature inversions. I used the SPLnFFT app (on an iPhone 5, iPhone 6, iPad tablet and iPhone 7) which is technically acceptable and yet gives results compatible with measurements using a hi-tech sound level meter [4,5,6]. Wind speeds on each day were below 5 km/h. We are topologically higher than the plant ground level, off line of sight of the plant and yet the Quarry noises, one of which originates from the Primary Crusher, still reach our residence. We measure sound power levels well above the “predicted” 35 dB(A).

Our locations details are given on page 1.

15. It is acknowledged that the distinctive sound of the primary crusher can be heard by residents near Towrang. However, the predicted noise levels in these areas are well below the project specific noise level (PSNL) of 35 dB LAeq(15min) determined in accordance with the NSW Industrial Noise Policy (INP). Notwithstanding this, Gunlake has committed to:

- enclosing the primary crusher as part of the extension project within four months of approval (see Section 6.4.3); and**
- not operating the primary crusher at night until it is enclosed.**

This enclosure should be done immediately. The community was promised this action in June 2016 at the Marulan Church Meeting. I was promised this enclosure in August 2015 on the GL CEO visiting our place to identify the offending PC. The Community Consulting Committee made frequent requests for all crushers to be properly enclosed to GL. Details and records can be found on GL's web site under the Excel worksheets kept for recording progress in resolving the Community's concerns. All other equipment with similar frequency and power characteristics should also be properly enclosed according to best practice.

In fact a compete power frequency spectrum is needed before any approval can be given to this project. There are other noise sources from the GL plant that the community can hear and quantify their measurements at their residences.

Enclosing the Primary Crusher would not contribute to any acceptable noise reduction.

I agree with the EMM and DPE reports that enclosing the Primary Crusher would achieve very little in the way of noise reduction from the GL site as a whole. Following the details given in ISO reference[7], I calculate the overall sound footprints at GL to be:

| Present Noise Sources | Present with - 5dB Crusher | Future Noise Sources |
|-----------------------|----------------------------|----------------------|
| 124.4 +/- 1.0 | 124.2 +/- 1.0 | 126.7 +/- 1.0 |
| 127.5 +/- 1.0 | 127.4 +/- 1.0 | 128.7 +/- 1.0 |

Table 1. Cumulative on-site noise sources in dB(A) units[4]. The second column allows for the nominal 5dB(A) reduction in the Primary Crusher. The second row includes the 124dB(A) source identified for a FEL loading the PC and trucks.

These results are based on EMM's Table 5.1 and the consequences of that not covering all active noise sources. As such the results are lower bounds for only the so-called identified sources. It is obvious that many other noise sources in site will have to be identified and modified in the way predicted for the PC. A recommendation would be to apply a 6dB(A) strict reduction in noise sources above 110 dB(A)(all

units are in sound power levels). To do this fairly would require a properly measured power spectrum (a graph of power versus frequency) for each of the **active** processing plant and associated equipment.

References

1. Gunlake Quarry Extension Project, EIS Report, EMM, Appendix K, Noise and Vibration assessment. February 2016.
2. DPE, Gunlake Quarry Assessment Report, December 2016.
3. Gunlake Quarry Extension Project, EIS, Response to Submissions, September 2106.
4. C. A. Kardous and P. B. Shaw, Evaluation of smartphone sound measurement applications, J. Acoust. Soc. Am., **135** (4), April 2014.
5. <https://blogs.cdc.gov/niosh-science-blog/2014/04/09/sound-apps/>
6. Chucri A. Kardous and Peter B. Shaw: JASA Express Letters [http://dx.doi.org/10.1121/1.4964639] Published Online 14 October 2016
7. International Organization for Standardization, Acoustics—Attenuation of sound during propagation outdoors, Report 9613—2, 1996.

Thank you for your time and we as a community sincerely appreciate your time and efforts in visiting the area. “It is not the Centre of the Universe” as the song goes, but its pretty close. We retired here to Tillicoultry in February 2012 after nearly 40 years in Canberra and immensely enjoy the lifestyle and environment and value our interactions within the local community.

Sincerely Yours

Dennis Isbister.

5th February 2017.