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27 September 2019

MAC190946LR1

Attention: Greg Thomson
VGT Environmental Compliance Solutions Pty Ltd
Unit 4/30 Glenwood Drive
Thornton NSW 2323

Dear Greg,

Noise Assessment Review: PGH Brickworks, Bringelly, NSW.

1 Introduction

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Technical Review (TR) of the historic Noise Assessment prepared (Wilkinson Murray Pty Limited, 2013) on behalf of Hyder Consulting Pty Ltd (Hyder) for the PGH Bricks (PGH) Brickworks Extension Project, Bringelly (the 'project').

The project site is located at 60 Greendale Road, Bringelly, NSW. A Noise Assessment (NA) was undertaken by Wilkinson Murray Pty Limited (WM) in 2013 as part of the Environmental Impact Statement (EIS) for the proposed upgrade of the brickworks and to update on site noise management in accordance with the NSW Industrial Noise Policy.

Several noise control options have been implemented at the project site, and subsequently PGH require a review of noise emissions to quantify the effectiveness of the noise controls against relevant noise criteria. In addition, where relevant the TR also provides opportunities and constraints for the project since introductions of the Noise Policy for Industry (EPA, 2017) which superseded the Industrial Noise Policy (EPA, 2000) on which the historic report was based.

2 Review Inputs

The following project specific and related documents/assessments have formed the review conducted by MAC:

- Development Consent SSD_5684, NSW Government, Department of Planning and Environment (DPE), 2015;
- Bringelly Brickworks and Quarry Expansion Environmental Impact Statement – Hyder Consulting prepared for Boral Bricks Pty Ltd, 5 September 2013; and
- Boral Brickworks, Bringelly Noise Assessment – Wilkinson Murray Pty Limited Report No. 12185-N Version D prepared for Hyder Consulting, May 2013.

The historic noise assessment formed Appendix E of the Environmental Impact Statement (EIS) by Hyder in 2013.

The review focussed on the historic assessment and the EIS prepared by Hyder, in particular the recommended mitigation measures required for the project to satisfy the relevant operational noise criteria that were also the basis for several conditions prescribed in the Development Consent (DPE, 2015).

3 Key Findings

3.1 Review of Mitigation Measures

The historic report predicted that noise levels would exceed the relevant criteria at residences on Loftus Road and Greendale Road. To mitigate the exceedances, reasonable and feasible noise controls were recommended. Several noise controls formed part of the Development Consent and included:

- Acoustically insulate crusher and box feeder buildings;
- Relocate driveway and install a noise barrier/bund; and
- Treat/mitigate front end loader (maximum sound power level of 102dBA).

For residences on Loftus Road, noise levels were predicted to exceed the criteria by up to 4dB during the daytime, evening and night periods, hence it was determined that treatment of box feeder and crusher buildings were required.

It is understood that the proponent has acoustically insulated the crusher and box feeder buildings. MAC conducted a site visit on 11 September 2019 to verify mitigation implemented since 2013 and to quantify the overall noise reduction associated with these controls. The site inspection confirmed that the treatment to the buildings has been completed, by means of an internal lining/curtain.

3.2 Attended Noise Monitoring Results

A 15-minute attended noise survey was conducted at the corner of Greendale and Hutchinson Road, Bringelly, NSW on Wednesday 11 September 2019. This location was adjacent to 23 Greendale Road (Receiver R14/WM14). The attended measurements were completed to quantify the noise emissions of site following noise treatments to the crusher and box feeder buildings. Additionally, the measurements quantified the overall noise contributions of truck noise emissions when entering and exiting the project site.

The survey was conducted in general accordance with the procedures described in Australian Standard AS 1055:2018, “Acoustics - Description and Measurement of Environmental Noise”. The acoustic instrumentation used carries current NATA calibration and complies with AS IEC 61672.1-2019- Electroacoustics - Sound level meters - Specifications. Calibration of all instrumentation was checked prior to and following measurements. Drift in calibration did not exceed ±0.5dBA.

The results from the attended noise monitoring are presented in **Table 1.**

Table 1 Noise Monitoring Results, 23 Greendale Road, Bringelly (WM14)

Date / Time	Descriptor (dBA re 20 µPa)				Meteorology	Description and SPL, dBA
	LAmax	LA_{10}	LA_{eq}	LA_{90}		
11/09/19 09:53	88	63	66	44	Calm Fine 20°C	Light vehicle entering PGH site 55-60 Trucks Greendale Road 70-73 (not site) Trucks Hutchinson Road 80-85 (not site) Truck entering/exiting PGH 52-62 (10 sec)
Project Contribution $LA_{eq(15min)}$						41
Project Criteria (Day-Brickmaking), $LA_{eq(15min)}$[1]						44

Note 1: As per Table 2, Schedule 3 of the Development Consent SSD_5684.

Attended noise monitoring identified that non-project related road traffic dominated the acoustic environment at the monitoring location. During the measurement, four trucks (two entering and two leaving site) passed the monitoring location. The brick plant, raw feed loader and associated truck loading was not audible throughout the 15-minute measurement.

Results of the attended monitoring identified that with implementation of the noise controls to the crusher and box feeder buildings, the project site satisfies relevant daytime criteria. Furthermore, the attended monitoring assessment identified that site trucks were not a significant contributor to received noise levels at the monitoring location (R14/WM14). Therefore, the requirement to relocate the driveway and install noise barrier/bund to mitigate against these sources should be re-evaluated. (Refer **Figure 1**.)

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FIGURE 1

PROJECT LAYOUT
REF: MAC190946

4 Re-evaluation of Drive-way Relocation and Barrier/Bund Construction

4.1 On Site Truck Noise on Access Road

The historic report assessed road trucks entering and exiting the project via the existing access road was based on a worst case operating scenario of four (4) truck movements '*overlap in the same 15 minute period'* and is reproduced below in **Extract 1**.

Extract 1

> In relation to truck movements it is considered that the "worst case" operating scenario would be during the event when 4 truck movements overlap in the same 15-minute period. This assumption incorporates 4 trucks arriving one after another and subsequently leaving the site in a similar mode. The selection of 4 trucks is based on space constraints of the loading dock as this is the maximum that can be loaded simultaneously. This scenario will not change under future operations as the loading dock is not subject to any upgrade.
>
> The time to enter and leave the loading bay is based on a 10 km/h speed limit over the respective distances. A B-Double model truck engine and exhaust have been taken into account and are time corrected according to the above assumption.

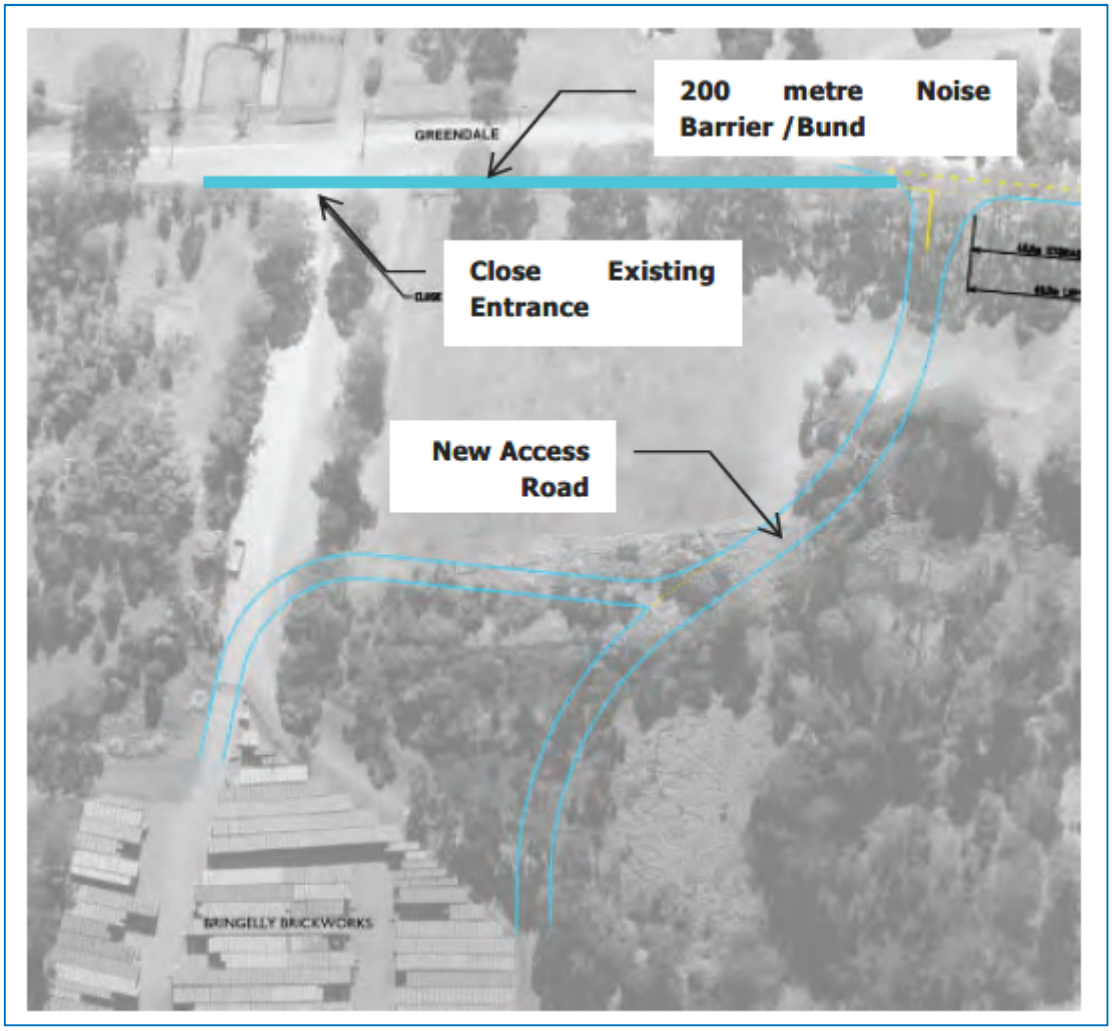
Attended noise measurements completed by MAC, confirm that the assumption of four truck movements in a 15-minute period is generally representative of what occurs at the project site. MAC's interpretation of 'overlap' and the description provided in **Extract 1** is that this would result in a total of eight (8) truck movements per 15 minute assessment period, which is considered overly conservative and represents a worst case assessment approach.

The historic report also concludes that truck noise on the access road is a significant contributor to off-site noise at receivers on Greendale Road by up to 10dBA (refer to **Extract 2**). Therefore, the NA has concluded that the noise contribution from trucks is 54dB $LA_{eq(15min)}$, proposing a noise barrier/bund and relocating the main access road to mitigate noise to satisfy the noise criteria of 44dBA (refer to **Extract 3**).

Extract 2

> 6.3.6 Greendale Road Residences
>
> Predicted noise exceedances at residences on Greendale Road of up to 10 dBA are due to truck daytime movements on the site access road. Residences nearest the site access road are,
>
> - 23 Greendale Road – 30 meters from site entrance
> - 9 Greendale Road – 75 meters from site entrance

Extract 3



4.2 Validation of Project Truck Noise on Access Road

To validate infield noise monitoring, MAC has modelled the worst-case operating scenario which is consistent with the historic report (**Extract 1**).

DGMR's iNoise (Version 2019.1) noise modelling software was used to assess noise from trucks travelling on the existing access road as a moving point source. The calculations incorporated a three-dimensional digital terrain model of the area and other aspects such as ground type, shielding from any natural or man-made features or adjacent buildings and atmospheric information to predict noise levels at the receivers on Greendale Road. The model calculation method used to predict noise levels was in accordance with ISO 9613-1 'Acoustics - Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the atmosphere' and ISO 9613-2 'Acoustics - Attenuation of sound during propagation outdoors. Part 2: General method of calculation'.

On-site attended measurements, completed on 11 September 2019, were analysed to calculate the Sound Power Level (Lw) of trucks, entering and exiting the project site. The resulting truck Lw was 95dB $LA_{eq(15min)}$. It is noted that the historic report adopted a Lw of 105dBA (Table 6-1 of the historic report) for noise modelling, at a speed of 10km/h. A truck Lw of 105dBA is considered to be more representative of trucks travelling at higher speeds between 50 to 60km/h. Hence, the historic report has adopted a worst-case methodology for this source which would result in overly conservative noise predictions.

MAC has modelled the worst-case operating scenario described by WM in **Extract 1** with the Lw determined from direct measurement of the source in-situ. The results of the validation calculations are presented in **Table 2**.

Table 2 Predicted Noise Level from On Site Trucks dBA re 20 µPa

Reference	No of Truck Movements	Speed km/h	Truck Lw	Predicted Noise Level	
				23 Greendale	9 Greendale
Historic Report worst case scenario	8	10	105	54	unknown
MAC worst case scenarios	8	10	95	41	35

Calculations demonstrate that daytime truck noise whilst on the project site are lower than the criterion of 44dB $LA_{eq(15min)}$. MAC worst case scenario noise calculations are generally consistent with in-field noise measurements. Therefore, based on in-field measurements and revised validation modelling, the noise barrier and access road re-location are not considered necessary to mitigate noise levels from trucks entering and exiting the project site and hence, their construction is not required. Additionally, any residual noise emissions from the brick plant have been attenuated via implementation of noise treatments to the crusher and box feeder buildings.

5 Conclusion

Muller Acoustic Consulting Pty Ltd (MAC) has completed a Technical Review (TR) of the historic Noise Assessment prepared (Wilkinson Murray Pty Limited, 2013) on behalf of Hyder Consulting Pty Ltd for the PGH Bricks (PGH) Brickworks Extension Project, Bringelly.

The findings of the review confirm that the recommended treatment to the primary crusher, crusher and box feeder buildings has been completed, with the installation of an internal lining/curtain to reduce noise emissions through the walls and roof. These treatments have been validated via in-field attended noise measurements to adequately attenuate noise levels to satisfy relevant criteria at receivers in the vicinity of R14/WM14.

The review identified that the historic assessment was based on a worst-case assessment approach. Subsequent in-field measurements and revised validation modelling identified the noise barrier and access road re-location are not considered necessary to mitigate noise levels. Therefore, their construction is not required.

We trust this information is satisfactory, if you have any questions please contact our office to discuss in more detail.

Yours sincerely

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Attached: MAC Terms and Conditions, Oliver Muller CV and Rod Linnett CV.

Reviewed: OM