11 May 2021
Document No. 60.00741.05 LTR2R1.DOCX

Jackson Environment and Planning Pty Ltd
Suite 102, Level 1
25 - 29 Berry Street
North Sydney
NSW 2060

Attention: Mark Jackson

Dear Mark

Addendum Report #2
Kariong Sand & Soil Supplies Facilities Upgrade
Noise & Vibration Reponses to the DPIE Submission

1 Introduction

Waves Acoustic Consulting Pty Ltd (Waves Consulting) provided a Noise & Vibration Impact Assessment (Document No. 60.00741.05 RPT1R3.DOCX) as part of the EIS for the Kariong Sand & Soil Supplies development, 90 Gindurra Road, Somersby, NSW.

During the EIS exhibition the Department of Planning, Industry & Environment (DPIE) have provided questions from an internal DPIE reviewer regarding noise and vibration impacts from the site. These questions will be addressed in this Addendum Report #2. The questions / issues from the DPIE review are addressed in order from Issue 1 to Issue 7.

Waves Acoustic Consulting Pty Ltd

Level 7, 1 York Street, Sydney, NSW 2000
ABN 80 610 696 449

+61 2 7900 5548
info@wavesconsulting.com.au
www.wavesconsulting.com.au

2 DPIE Questions / Issues

2.1 Issue 1

The DPIE queries are reproduced and discussed separately below:

Issue 1 – use of sound level from equipment supplier datasheet

Table 2 of the NVIA provides the estimated sound power levels for proposed equipment and activities utilised in the operational noise modelling. The NVIA states that the overall A-weighted sound power levels have been estimated from manufacturers data, which are usually obtained under dynamic test conditions in accordance with the *International Standard ISO 6395:2008* (or equivalent). Forward warning horn or reversing movement alarms are not activated during the specified test conditions. Further, industrial processes frequently involve operations such as material handling and unloading/loading activities which generate incidental noise that are not captured by *ISO 6395* measured noise level data. Therefore, the modelled operational noise emission scenarios are unlikely to be representative of the proposed operational activities of the development.

The NVIA has used manufacturers data whenever possible. Waves Consulting has found in over 20 years of analysing manufacturers data that specific testing methodologies are rarely given. If manufacturers do provide the methodology, it is extremely rare that the testing is conducted by a qualified consultant with calibrated equipment (its typically an employee at the manufacturer with unknown qualifications or experience).

Waves Consulting has taken the available information and applied reasonable safety factors to the noise emission levels (with reference to data sources such as DEFRA[1]). The noise levels used in the NVIA are in the high range of noise levels typically emitted by each type of equipment.

Using these high range noise levels Waves Consulting found exceedances of the noise criteria at several residences. The NVIA has recommended a significant number of reasonable and feasible noise control measures which are proposed on site. These measures include a 5 m concrete noise wall along the majority of the boundary, 3 m high noise walls local to all materials handling areas and semi enclosure of tip and spread, crushing and screening operations.

The NVIA demonstrates that these noise control measures reduce the noise emissions from the site significantly and all residential receiver noise levels are below the PNTLs during all time periods. Overall, Waves Consulting believes the modelled operational noise emissions are consistent with the expected noise emissions from the proposed development.

The issue associated with using noise level data from equipment manufacturers and suppliers is exemplified as follows. The *British Standard BS 5228-1:2009+A1:2014* indicate that LAeq sound power levels for 40t excavators undertaking a variety of activities are in the range of 105 dB(A) to 114 dB(A). The lower value of 105 dB(A) corresponds to trenching with an excavator whereby steady engine/fan noise is likely the dominant source of operational noise. In contrast, the higher value of 114 dB(A) corresponds to an excavator breaking and spreading rubbles which includes non-steady incidental noise associated with material handling.

[1] Department of Environment, Food and Rural Affair (DEFRA) - Update Of Noise Database For Prediction Of Noise On Construction And Open Sites (nominally the same as database as BS 5228-1:2009 + A1:2014)

The noise levels used in the NVIA are in the high range of noise levels typically emitted by each type of equipment. These noise levels emissions provide a reasonable worst-case assessment for the development.

In the sensitivity analysis presented in Section 3 below, the noise impact outcomes from the site are investigated when noise emissions from the site are increased significantly and when all plant and equipment is assumed to operate for 100% of the time in any 15-minute period.

The noise sensitivity test investigated in Section 3 further demonstrates, that even if major items of plant are significantly louder than modelled in the NVIA, the potential for adverse noise impacts are still low.

The Department requires all operational modelling assumptions be clearly identified and justified in the amended NVIA, including an updated source emission inventory that delineate steady and non-steady noise generating activities and a visual illustration that maps the location of modelled sources. The NVIA shall adhere to the reporting requirements for steady and non-steady sounds specified in the *Australian Standard AS 1055:2018 Acoustics – Description and Measurement of Environmental Noise*, which includes the range of sound levels, percent exceedance sound levels and events. The information required by the Australian Standard is needed to quantitatively determine the prominence of impulsivity of non-steady sounds for prediction and compliance purposes.

The NVIA clearly identifies all noise sources, the sound power levels for each source (Table 2 and 3) and details all modelling assumptions (Section 5). The modelling assumptions show that all fixed sources of noise operate at 100% load throughout any 15-minute period. Mobile sources such as loaders which have varying throttle speeds throughout operation have been assumed to operate at 100% load for 50% of the time to account for this variability.

The impulsive / intermittent nature of the noise sources are discussed within the context of the NSW NPI and the corrections for annoying characteristics.

2.2 Issue 2

The DPIE query is reproduced below:

Issue 2 – use of sound level from the consultant's noise database

Octave band frequency spectrum for each noise source was said in the NVIA to be derived from the acoustic consultant's noise database for similar plant and machinery. Details of on-site sound power level measurement survey (including measurement methodology, process/activity description, processing/production rate, sound pressure and power level data) undertaken to develop the operational noise model must be provided as an appendix to the NVIA. The ability for independent reviewers to undertake a comprehensive technical review is greatly hindered by the absence of measurement survey records.

The NVIA clearly identifies the octaves band frequency spectrum for each noise source used in the assessment (Table 2 and 3). The frequency spectrums used in the NVIA accurately reflect the equipment nominated at the site as they are based on the DEFRA database (nominally the same database as British Standard BS 5228-1:2009 + A1:2014).

Based on the information in the NVIA it is possible to independently review the octave band frequency spectrums for each piece of equipment to determine if they are representative of the nominated equipment.

2.3 Issue 3

The DPIE query is reproduced below:

Issue 3 – Utilisation of mobile plant within any given 15-minute period

Mobile plant such as front-end loaders and excavators were assumed to operate at full load for 50% of the time within any given 15-minute assessment period (see extract from the NVIA below). It is unclear whether full load operation for 50% of the time is representative of the worst-case noise emission scenario. The corresponding 15-minute material processing rate need to be specified in the amended NVIA.

Section 3 - Sensitivity Analysis, below investigates the noise impact outcomes from the site when noise emissions from the site are increased significantly and when all plant and equipment is assumed to operate for 100% of the time in any 15-minute period.

2.4 Issue 4

The DPIE query is reproduced below:

Issue 4 – procedure for the estimation of reverberant sound levels is unclear

Table 3 of the NVIA provides the estimated reverberant sound levels for proposed indoor equipment within the new processing shed. The procedure and assumptions used for estimating reverberant sound levels are not specified in the submitted NVIA and must be clearly described in the next amendment.

The noise levels used in the report were taken from a similar sized building which undertook equivalent recycling and sorting operations in Smithfield, Sydney. Over 30 measurements were undertaken during the study at this site. The levels used in the NVIA represent the worst-case noise levels generated by the similar facility. An internal noise level of 89 dB LAeq is very loud (especially for a large building) and would require permanent PPE ear protection for workers if this level were sustained during an 8-hour shift. The reverberant noise levels used in the NVIA are considered high and provide a conservative assessment as a result.

2.5 Issue 5

The DPIE query is reproduced below:

Issue 5 – traffic noise estimation procedure is unclear

Further to the above, the methodology utilised by in the NVIA to calculate road traffic noise is also not specified in the NVIA. It can however be deduced from the results presented in Table 17 (Summary of Traffic Noise Increases on Surrounding Roads) that the adopted traffic noise calculation procedure is rudimentary and only considered the change in the percentage of heavy vehicles. As stated in Appendix B4 of the NSW Road Noise Policy, the selected traffic noise procedure must be justified according to the circumstances of the project. To ensure noise impacts associated with the proposed operation of the development are identified and mitigated, the Department expects the following factors be addressed in the prediction of road traffic noise:

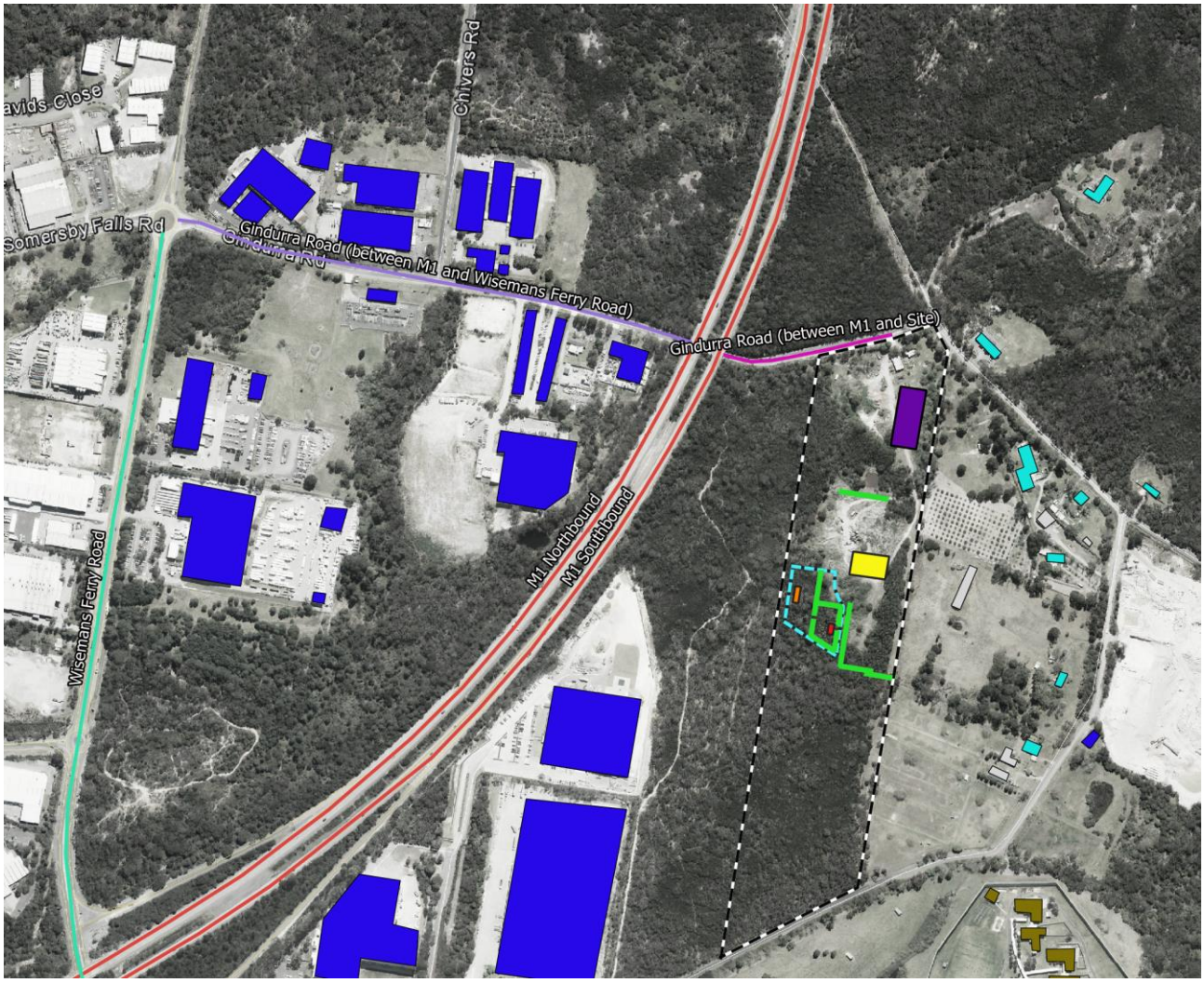
- Clear distinction between the heavy vehicle types such as rigid trucks, truck and dog, semi-trailers and B-doubles
- Acceleration performance of each broad heavy vehicle category and the corresponding acceleration speed-distance profile
- Noise emission levels under steady speed, accelerating and decelerating driving conditions.

The aforementioned factors affect the duration of vehicle passage time, maximum pass-by vehicle sound power level as well as the contributions of rolling noise and engine noise, which must be considered to provide an accurate prediction of the change in L_{Aeq} road traffic noise at nearby residential receivers. In the absence of a prediction tool that can accurately evaluate the change in traffic flow conditions, road traffic noise pollution can be underestimated and result in unsatisfactory outcomes even after the implementation of noise abatement strategies.

The NVIA used the CoRTN algorithms to estimate the changes in noise levels due to traffic increases on the surrounding road network. The study found that the changes were very low (in all cases much less than 1 dB). This easily satisfies the NSW RNP 2 dB increase criteria. Waves Consulting acknowledges recent advances in traffic noise modelling for Australian conditions presented in several papers by Jeffrey Peng et al, which account for detailed vehicle types and changes to driving conditions. However, we do not believe that these are applicable to this site.

Figure 1 below illustrates the site, the surrounding roads, and the surrounding receiver types. From Figure 1 we can see that Gindurra Road (between M1 and Site, shown in Pink) is the only road in the assessment with the potential for noise impacts at the residential receivers to the east (light blue). All other roads, which route traffic from the development, predominately impact industrial receivers (dark blue) which are not considered in the NSW RNP criteria.

Figure 1. Site and Surrounding Roads



Gindurra Road has a speed limit of 50 km/h. Approximately 200 m of Gindurra Road has the potential to impact residential (light blue) receivers ie between the M1 and the Site. After Gindurra road passes under the M1 the only receivers adjacent to the road are industrial receivers (dark blue).

Given the low speed, the short applicable section of Gindurra Road and the proximity of the M1, Waves Consulting does not believe the new methodologies are applicable. In this case, the CoRTN assessment in the NVIA adequately demonstrates the low risk of adverse traffic noise impacts from the site.

2.6 Issue 6 – Environmental Noise Monitoring

The DPIE query is reproduced below:

Environmental noise monitoring

To characterise the existing acoustic environment at residential assessment locations, a survey of environmental noise levels was adjacent to the residential property at 12 Acacia Road, Somersby, NSW (see Figure 1). The noise environment surrounding the proposed site was said to be dominated by a combination of local industrial noise and traffic noise from the Pacific Motorway. The contribution of noise from these distinct sources would vary depending on the distance between each source and the receiver location. The Applicant need to demonstrate the recorded noise monitoring data is representative of the background noise at the most-affected residential receiver location in the study area. For a residence, the project noise trigger level and maximum noise levels are to be assessed at the reasonably most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most-affected point within 30 metres of the residence.

The noise monitoring location is suitable and is representative of the local noise environment. The location was selected after a site visit by the NVIA author – a noise consultant with 20+ years of experience with environmental noise monitoring. After listening to the noise environment around the site the consultant determined the best location for the environmental noise monitor based on the following observations:

- The location is on the boundary of 10 Acacia Road – the closest residential receiver to the subject site.
- The location is not unduly influenced by the noise emissions from the industrial sites to the west.
- The location is not unduly influenced by the noise emissions from the quarry to the east.
- The location is not unduly influenced by the noise emissions from the M1 to the west.
- The location is not unduly influenced by the noise emissions from Gindurra / Debenhams Road South which is located to the north.
- The location is not unduly influenced by the noise emissions from Acacia Road to the east.
- The location is not unduly influenced by potential noise emissions from residences such as AC units etc.

The logger location selected provides a balanced mix of the noise sources in the environment and is suitable for determining the representative background noise levels and therefore the criteria for the site.

2.7 Issue 7 – Annoying Characteristics

The DPIE query is reproduced below:

Annoying noise characteristics

Operational noise generated from stockpiling and loading/unloading activities has the potential to be perceived as impulsive at nearby residential receivers. The NVIA states that a +5 dB(A) modifying factor has been applied to the predicted noise levels at residential receiver locations. Inclusion of a +5 dB(A) factor for impulsive noise needs to be clearly noted as part of Table 16 (predicted operational noise) and Appendix B (noise contour maps). Furthermore, the ability for the proposed noise mitigation measures to minimise impulsive noise characteristics need to be discussed.

The annoying characteristics for impulsive / intermittent noise are only applicable during the night. The equipment with the potential for impulsive or intermittent noise events do not operate at night. The predicted noise level tables and noise contour graphs in the report do not need to be changed as a result.

3 Sensitivity Analysis

To illustrate the noise sensitivity of the development Waves Consulting will add an additional 6 dB safety factor to all the external plant items and will assume that these plant items run for 100% of the time during any 15-minute assessment period.

Table 1 below summarises the plant source levels with the added 6 dB safety factor.

Table 1. Estimated Sound Power Level of the Proposed Outdoor Plant (with 6 dB safety factor)

Description	Overall L_{WA} (dB re 1pW)	Octave Band Centre Frequency (Hz) Lw (dB re 1 pW)							
		63	125	250	500	1000	2000	4000	8000
Volvo L150 Front End Loader	114	104	112	114	110	110	105	99	98
CAT 329F Excavator	111	113	113	109	110	105	102	94	82
Rubble Master RM100 Crusher	114	121	121	119	109	104	103	98	97
Kleeman Screen	116	119	117	114	114	109	109	106	99
Wood Shredder 2710D	116	109	109	109	109	109	109	109	109

The overall noise levels in Table 1 now represents the upper limit of noise emissions that can be reasonably expected for each piece of equipment. The 1/3 octave bands have been scaled accordingly.

The noise model from the NVIA was re-run using the new source levels in Table 1 and assuming 100% operation during any 15-minute period for all noise sources. A selection of the predicted worst-case operational noise levels due to onsite noise sources (with mitigation measures, plus 6 dB safety factor, plus 100% on-time) are summarised and compared against the NPI project noise trigger levels in Table 2 below.

Note that the changes above will only affect the daytime noise levels as during the evening and night-time the site is not operational except for infrequent delivery vehicles.

Table 2. Predicted Operational Noise Levels Compared to PNTLs (with Mitigation, plus 6 dB safety factor, plus 100% on-time)

Location	Worst-Case $L_{Aeq,15m}$			PNTLs Exceedance $L_{Aeq,15m}$			$L_{Aeq,15m}$ Sleep Disturbance
	Day	Eve	Night	Day	Eve	Night	
Residential				**48**	**43**	**43**	**49**
5 Kowara Rd	26	≤20	≤20	0	0	0	0
9 Kowara Rd	28	≤20	≤20	0	0	0	0
31 Kowara Rd	26	≤20	≤20	0	0	0	0
41 Kowara Rd	28	≤20	≤20	0	0	0	0
51 Kowara Rd	28	≤20	≤20	0	0	0	0
10 Acacia Rd	47	33	30	0	0	0	0
12 Acacia Rd	44	32	29	0	0	0	0
16 Acacia Rd	42	29	26	0	0	0	0
32 Acacia Rd	41	30	27	0	0	0	0
125 Debenhams Rd Sth	≤20	≤20	≤20	0	0	0	0
127 Debenhams Rd Sth	24	≤20	≤20	0	0	0	0
129 Debenhams Rd Sth	27	≤20	≤20	0	0	0	0
184 Debenhams Rd Sth	23	≤20	≤20	0	0	0	0
198 Debenhams Rd Sth	30	≤20	≤20	0	0	0	0
214 Debenhams Rd Sth	36	≤20	≤20	0	0	0	0
223 Debenhams Rd Sth	36	27	24	0	0	0	0
242 Debenhams Rd Sth	49	37	33	**1**	0	0	0
252 Debenhams Rd Sth	44	33	20	0	0	0	0
Correctional / Residential				**48**	**43**	**43**	**49**
Frank Baxter Juvenile Justice Centre	48	30	26	0	0	0	0
Commercial / Active Recreation				**53**	**53**	**-**	**-**
Central Coast Riding for the Disabled	53	31	28	0	0	-	-
Industrial				**68**	**68**	**68**	
All Industrial sites	<60	<30	<30	0	0	0	-

The results from Table 2 demonstrate that the noise emissions from the site to the surrounding environment are low, even with the additional 6 dB safety factor and 100% on-time operation. The proposed development satisfies the PNTLs at all nearby residential receivers except for 242 Debenham Road South which has a 1 dB exceedance above the trigger level.

Table 3 below reproduces Table 4.1 and 4.2 from the NPI. This information gives guidance on the significance of residual impacts at residential premises when all other reasonable and feasible mitigation measures have been implemented.

Table 3. Significance of Residual Impacts as per Table 4.1 and 4.2 of the NPI

Predicted Noise Level minus PNTL	Total Cumulative Industrial Noise Level	Significance of the Residual Noise Level
≤ 2	Not applicable	**Negligible** - The exceedances would not be discernible by the average listener and therefore would not warrant receiver-based treatments or controls.
≥ 3 but ≥ 5	< recommended amenity noise level or > recommended amenity noise level, but the increase in total cumulative industrial noise level resulting from the development is less than or equal to 1 dB	**Marginal** - Provide mechanical ventilation/comfort condition systems to enable windows to be closed without compromising internal air quality/amenity.
≥ 3 but ≥ 5	> recommended amenity noise level and the increase in total cumulative industrial noise level resulting from the development is more than 1 dB	**Moderate** - As for 'marginal', but also upgraded façade elements, such as windows, doors or roof insulation, to further increase the ability of the building facade to reduce noise levels.
> 5	≤ recommended amenity noise level	
> 5	> recommended amenity noise level	**Significant** - May include suitable commercial agreements where considered feasible and reasonable.

In this case, the 1 dB exceedance at 242 Debenham Road South is considered to be negligible as per the guidance in the NPI. The noise emissions from the site to all residential receivers are therefore considered compliant with the NPI guidelines. No further mitigation measures or actions would be required as result.

Overall, Waves Consulting believe the noise levels in the NVIA are appropriate based on the available manufacturers data and represent worst-case operational noise emissions from the site.

The noise sensitivity test investigated above has further demonstrated, that even if major items of plant are significantly louder than modelled in the NVIA, the potential for adverse noise impacts are still low.

I trust this addendum provides sufficient detail for your current requirements. If you have any questions, please do not hesitate to contact me.

Yours sincerely

Tom Cockings
Director | Acoustic Engineer

M: +614 3121 2614
E: tom@wavesconsulting.com.au

Waves Acoustic Consulting Pty Ltd