RAIL NOISE AND VIBRATION ASSESSMENT

18 Gosford Road, Wyee, NSW, 2259

Prepared for Optima Developments Pty Ltd

Prepared by RCA Australia

RCA ref 15076-101/1

November 2020

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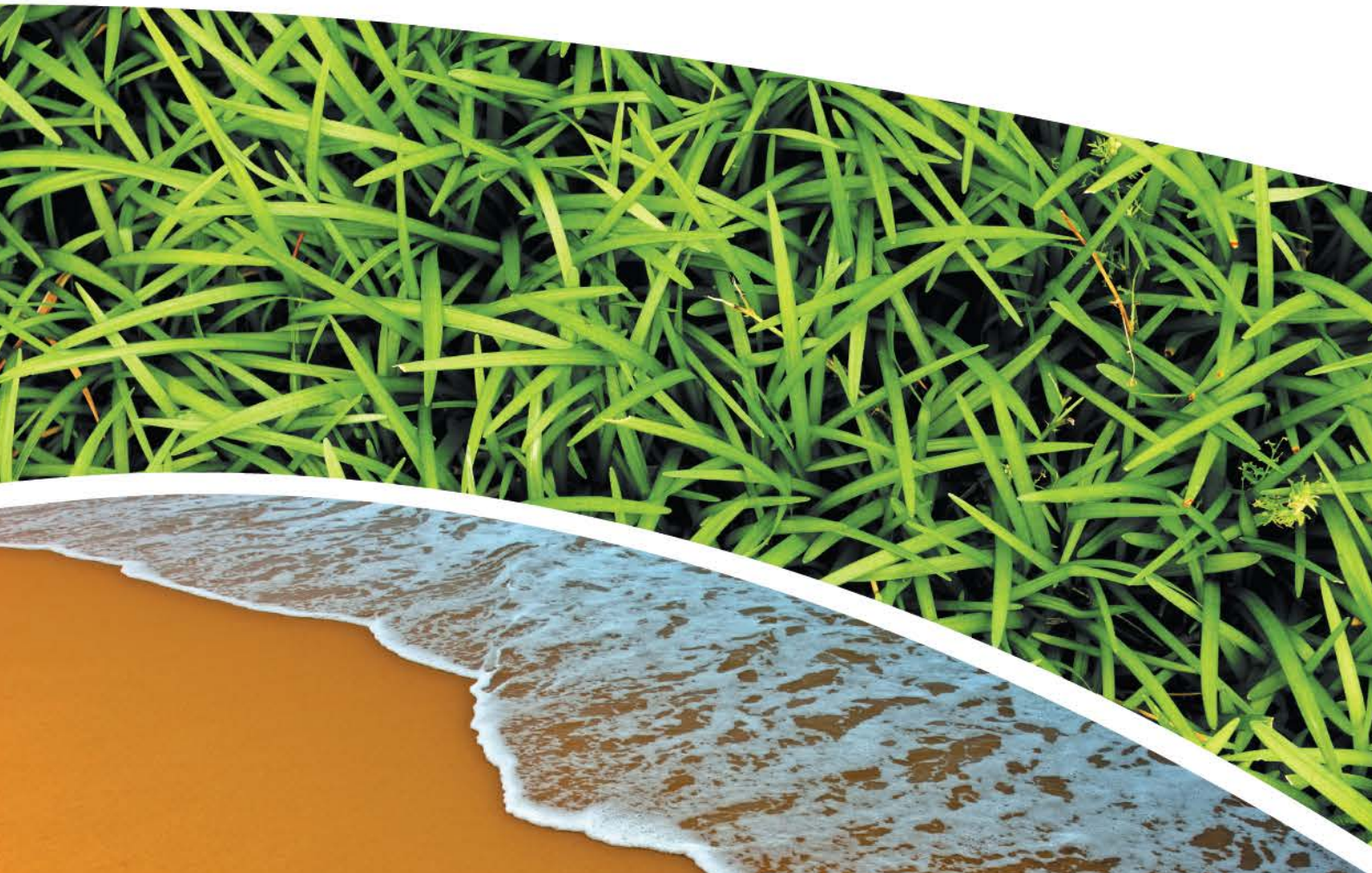

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Geotechnical Engineering
Engineering Geology
Environmental Engineering
Hydrogeology
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Sound & Vibration
Occupational Hygiene

RCA ref 15076-101/1

9 November 2020

Optima Developments Pty Ltd
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Attention: Mr Chris Oliver

RAIL NOISE ASSESSMENT
18 GOSFORD ROAD, WYEE, NSW 2259

1 INTRODUCTION

RCA Acoustics (RCA) has been engaged to conduct a noise and vibration impact assessment at 18 Gosford Road, NSW. The closest property boundary is within 50m of the Main Northern Railway. The purpose of this report is to quantify how rail noise propagates across the proposal site and assess the general suitability for residential development.

1.1 SITE DESCRIPTION

The site is located at 18 Gosford Road, Wyee and is adjacent to the Main North Line. Noise monitoring was conducted on site to measure the noise contributions from rail. **Figure 1** shows the site location and the noise monitoring locations.

Figure 1 *Site location highlighted orange, with rail corridor highlighted yellow*

2 NOISE MONITORING

Rail passby events have been measured on site using a combination of attended and unattended monitoring. Attended monitoring did not successfully capture sufficient passby events without extraneous noise and so have not been included in this report.

Two noise loggers were deployed between 16th September to the 19th of September, and continuously recorded statistical noise data over 15-minute integration periods. Both loggers were placed so that they had line of sight to the train line, at a height of approximately 1.2 m. One was left secured close to the western property boundary and the other one was left secured to a tree close to the eastern side of the property. This separation distance allowed RCA to later verify the noise propagation across the site.

The calibration of the noise monitoring equipment was checked before and after the monitoring period and was found to be within 0.5 dB tolerance of 94 dB. All equipment holds current NATA calibration certificates. Additional notes regarding the noise loggers and calibrator are provided in **Table 1**.

Table 1 *Equipment details*

Make/Model	Serial Number	Settings	Measurement method
SVAN / 971	61419	'A' weighted 'Fast' time response	Unattended monitoring
SVAN / 971	55580	'A' weighted 'Fast' time response	Unattended monitoring
Calibrator	BnK Type 4230	1558684	-

3 METHODOLOGY & RESULTS

3.1 RAIL NOISE MONITORING

Logged data was examined to identify train passby events. Based on these measurements, the total rail noise level received at the logger location was determined for day and night periods. The measured day and night rail noise levels from both unattended noise monitors were compared and used to calibrate a computer noise model using software CadnaA (version 2020). This 3D computer noise model then allowed RCA to predict the noise levels at any location within the site as shown in **Appendix B**. A representative freight train passby noise spectrum was selected from the unattended measurements data. This spectrum has been used in the calculations discussed further below as well as in CadnaA as a noise source.

The 15hr day and 9hr night noise levels measured between the 16th September and 19th September are shown in **Table 2**. The "day" data set from the 18th of July has been selected as our day time noise (LAeq,15hr 61 dBA) model calibration input. The "night" data set from the 16th of July has been selected as our night time noise (LAeq,91hr 58 dBA) model calibration input. We have taken the highest measured noise levels during all the assessment period as our day/night time noise model calibration input.

Table 2 *Measured day and night overall rail noise levels*

Assessment period	Measured noise level
16th Day time	58 dB $L_{Aeq,8hr}$
16th Night time	58 dB $L_{Aeq,9hr}$
17th Day time	60 dB $L_{Aeq,15hr}$
17th Night time	56 dB $L_{Aeq,9hr}$
18th Day time	61 dB $L_{Aeq,15hr}$
18th Night time	56 dB $L_{Aeq,9hr}$
19th Day time	57 dB $L_{Aeq,4hr}$

Adopted day and night noise levels to calibrate noise model are shaded light blue.

3.2 COMPUTER NOISE MODEL

A representative freight train passby noise spectrum from the closest logger was selected from the unattended data between the 16th September and 19th September. This train spectrum was then used as our sound source for the computer noise model in CadnaA.

The measured noise level difference between both noise monitors, 61419 and 55580 was found to be 9dB. The L_{Amax} for the freight train at 00:36hrs was 81.5 dB at the noise monitor 61419 and 72.1 dB for the noise monitor 55580 as shown in **Figure 2**.

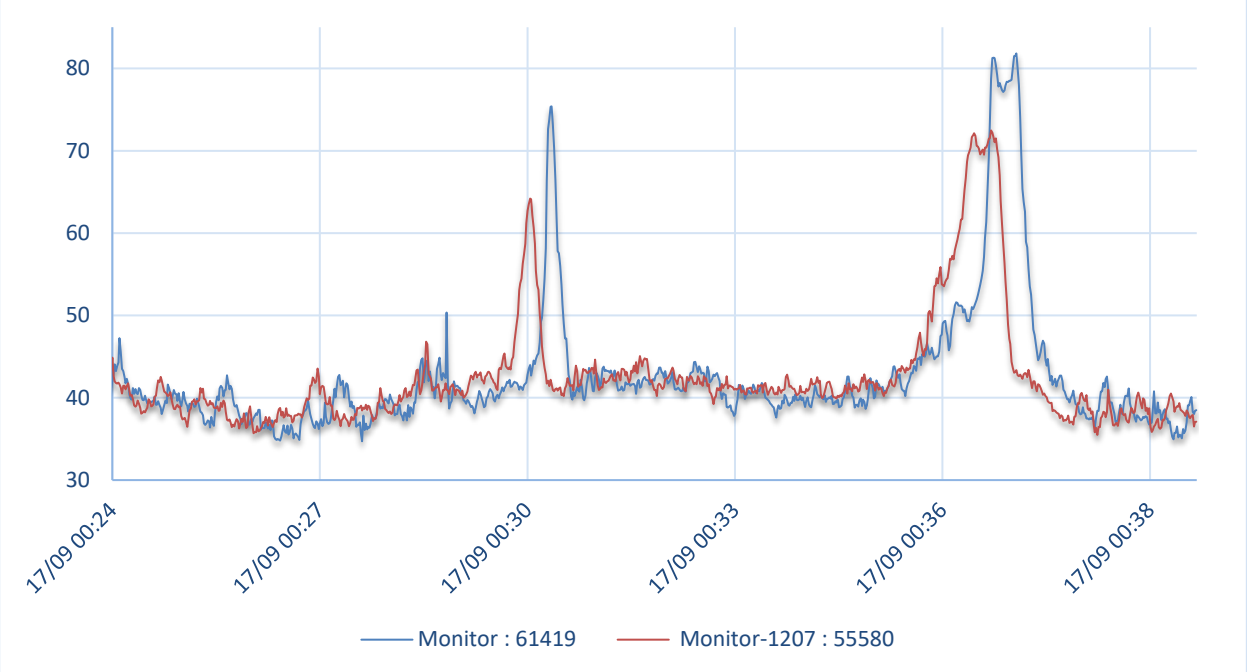

Figure 2 *Difference between logger locations*

Once the computer noise model was calibrated with the unattended noise monitoring data, day time and night time noise level contours were generated across the proposal for free field conditions. These are provided in **Appendix B**.

3.3 RAIL VIBRATION

The proposed development site is at least 50m from the nearest operational train track. The DoP guideline indicates that residential developments within the 25m zone will need vibration assessment. RCA conclude that vibration impacts on site are considered low risk.

4 DISCUSSION

The Infrastructure SEPP (2007) sets internal noise criteria for residential developments near public transport infrastructure. These criteria are also provided in the DoP guideline and are reproduced in **Table 3**.

Table 3 *Transport noise criteria for new residential developments*

Residential Buildings		
Type of occupancy	**Noise level**	**Applicable time period**
Sleeping areas (bedrooms)	35	Night: 10 pm – 7 am
Other habitable rooms	40	At any time

Note: airborne noise is calculated as Leq (9hr) (night) and Leq (15hr) (day).

Nigh time noise sound levels of 58 dB $L_{Aeq,9hr}$ were measured on the western boundary of the site close to the train track as shown in **Appendix B**. This would be approximately 60 dB $L_{Aeq,9hr}$ including a façade reflection at a façade. A bedroom adjacent to the rail would need $L_{Aeq,9hr}$ 60 dB - 35 dB= 25 dB sound reduction to meet the above criteria. Construction materials can readily achieve this noise sound level reduction.

L_{Amax} analysis showed approximately 10 events in a night ranged in L_{Amax} levels between 80 – 90 dB adjacent to the rail. These L_{Amax} levels were found to be from the train horn. While the SEPP criteria shown in **Table 3** does not include internal L_{Amax} levels, we note that noise from the train horn will cause sleep disturbance impacts unless designed against. Adjacent properties with bedrooms facing the rail would require significant noise treatment design to reduce internal noise levels to avoid sleep disturbance. Consideration of layout of properties adjacent to the rail will be required to avoid sleep disturbance impacts. We would suggest bedroom windows should not directly face the rail.

With consideration to design layout and construction materials, the proposal site will be suitable for residential development. The suitability of Individual property design will need to be assessed on a case by case basis, and will be determined by the layout and proposed construction materials.

5 CONCLUSION

RCA has been engaged to conduct a noise and vibration impact assessment at 18 Gosford Road, NSW. With consideration to design layout and construction materials, the proposal site will be suitable for residential development.

Yours faithfully

RCA Acoustics

Dario Barbosa
Acoustic Consultant

Appendix A

Terminology

dB(A) ..... Unit of sound pressure level, modified by the A-weighting network to represent the sensitivity of the human ear.

SPL..... Sound Pressure Level (SPL), the incremental variation of sound pressure from the reference pressure level, 20 µPa, expressed in decibels.

L_{eq}..... Equivalent continuous noise level averaged over time on an equivalent energy basis.

Background Noise Level..... Noise level determined for planning purposes as the one tenth percentile of the ambient L_{A90} noise levels.

VDV ..... Vibration dose value, a cumulative vibration measure based on acceleration and weighted for human comfort.

eVDV ..... Estimated vibration dose value.

Appendix B

Noise level contours

Locality Plan
N.T.S.

Wyee Road

Jabbarup Road

Gosford Road

MURRAWAL ROAD

JABBARUP ROAD

PROPOSED ROAD 1

SITE PLAN - PROPOSED SUBDIVISION

LOT 155 DP 800

LOT 156 DP 8005

DB Contours

50	70
55	75
60	80
65	85

Aerial image taken from Nearmap, August 4 2020
(used in accordance with commercial licence)

0 15 30 60 90 120
metres

N

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L_{Aeq15} HRS RAIL NOISE CONTOURS FOR DAY 18 GOSFORD ROAD WYEE

CLIENT	Optima Developments Pty Ltd			RCA Ref	15076-401/1
DRAWN BY	DB	SCALE	1:2,500 (A3)	DRAWING No 1	REV 1
APPROVED BY	--	DATE	9/11/2020	OFFICE	NEWCASTLE

Locality Plan
N.T.S.

Wyee Road

Jabbarup Road

Gosford Road

MURRAWAL ROAD

LOT 155 DP 8005

LOT 156 DP 8005

PROPOSED ROAD 1 (18 WIDE)

PROPOSED ROAD 1 (18 WIDE)

JABBARUP ROAD

SITE PLAN - PROPOSED SUBDIVISION

GREAT NORTHERN RAIL

SYDNEY - NEWCASTLE

WYEE STATION

MGA

DB Contours

45 65
50 70
55 75
60 80

Aerial image taken from Nearmap, August 4 2020
(used in accordance with commercial licence)

0 15 30 60 90 120
metres

N

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LAeq 9HRS RAIL NOISE CONTOURS FOR NIGHT 18 GOSFORD ROAD WYEE

CLIENT	Optima Developments Pty Ltd			RCA Ref	15076-401/1
DRAWN BY	DB	SCALE	1:2,500 (A3)	DRAWING No 2	REV 1
APPROVED BY	--	DATE	9/11/2020	OFFICE	NEWCASTLE