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Prepared for: Meriton

PROPOSED RESIDENTIAL DEVELOPMENT AT

LOT 104 IN PRECINCT C, RHODES PENINSULA

TRAIN NOISE AND VIBRATION ASSESSMENT

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TABLE OF CONTENTS

1. INTRODUCTION

An assessment has been undertaken of the impact of train noise and vibration on the acoustic amenity of the proposed development. The following noise sources have been assessed:

- Northern Line rail corridor.

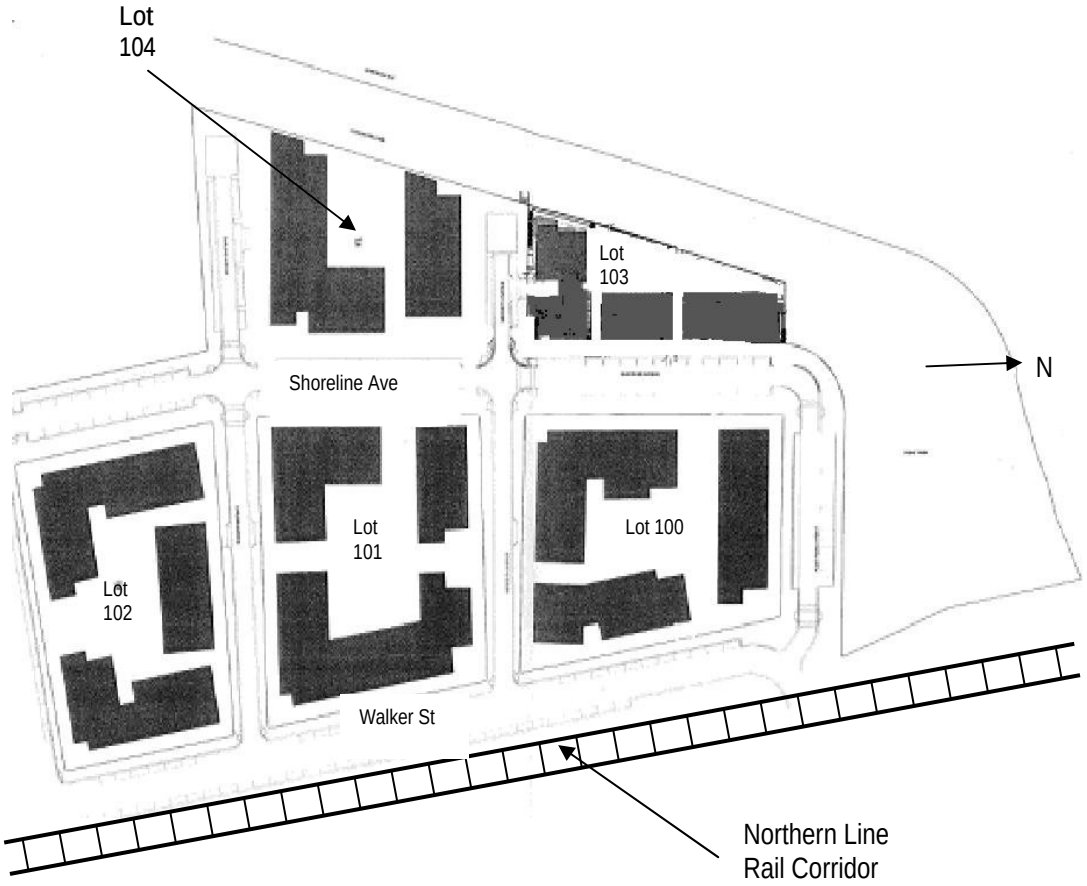
Rail traffic noise and vibration levels at the site have been measured and assessed in accordance with the requirements of the local council.

The assessment is based on drawings provided by Nation Viney Architects/ Urban Designers with drawing numbers job no. 08.05.15, 04DA Rev A to 17 DA Rev dated 19/2/07. In addition the assessment takes into account the masterplan of the site which would include buildings for Lot 100, Lot 101, Lot 102 and Lot 103 providing shielding from the rail corridor to the buildings in Lot 104.

The buildings are typically of concrete construction. All habitable rooms were assumed to have carpeted floors.

2. SITE DESCRIPTION

The proposed site is located on Lot 104 in Precinct C, Rhodes Peninsula facing Shoreline Avenue. The subject site is potentially affected by rail traffic noise generated by the Northern Line rail corridor, approximately 120m east of the site.



3. PROJECT NOISE OBJECTIVES

3.1 RAIL NOISE

Council requires that rail noise located adjacent to train lines must be assessed in accordance with AS3671 and AS2107. It is noted that the requirements of these standards are achieved when assessed in accordance with the Rail Infrastructure Corporation (RIC) and State Rail Authority (SRA) requirements. RIC and SRA in their publication 'Interim Guidelines for Councils – Consideration of Rail Noise and Vibration in the Planning Process' dated 2003 nominate criteria for residential units which are assessed internally with windows closed. These are detailed in Table 1 below.

Table 1 – Internal Railway Noise Level Criteria

Location	Time of Day	$L_{Aeq,1hr}$ dB(A)
Living and sleeping areas	Day (7am-10pm)	40
	Night (10pm-7am)	35

4. MEASUREMENTS

Measurements were performed generally in accordance with the Australian Standard AS 1055 - "Description and measurement of environmental noise - General Procedures".

4.1 RAIL TRAFFIC NOISE MEASUREMENTS

4.1.1 Measurement Locations

Rail noise measurements were conducted in line with the proposed Walker Street facade for Lot 100 which is nearest to the railway lines. The noise levels are predicted for Lot 104 taking into account barrier effects (where applicable) and distance from the measurement location.

4.1.2 Time of Measurements

Manned measurements were conducted on 1 December 2005.

4.1.3 Measurement Equipment

A Norsonic type SA118 Sound Analyser was used for the noise measurements. The analyser was set to fast response and calibrated before and after the measurements using a Norsonics Sound Calibrator type 1251. No significant drift was noted.

4.1.4 Measured Noise Levels

The external noise levels from measurements conducted on site are detailed in Table 2 below.

Table 2 – External Noise Levels

Location	Day L_{eq} (1hr) Noise Level dB(A)	Night L_{eq} (1hr) Noise Level dB(A)
Proposed Walker Street façade for Lot 100	61	61

5. EVALUATION OF NOISE INTRUSION

Noise intrusion into the apartments was assessed using the measured levels in Section 4.

Calculations were performed taking into account the orientation of windows, barrier effects (where applicable), roof, the total area of glazing, facade transmission loss and room sound absorption characteristics. In this way the likely interior noise levels can be predicted.

In all cases, the selected glazing type (refer below) reduces internal noise levels to within the nominated criteria for the various space types. The external noise levels used in the calculations are those that would occur when the buildings are constructed on the site.

The floor finishes for the living and bedroom spaces have been assessed as having carpet finishes.

5.1 RECOMMENDED GLAZING

Table 3 lists the recommended glazing assemblies for this project. Glazing to all rooms not listed may be standard glazing without acoustic seals for windows and doors.

The glazing thicknesses recommended are those needed to satisfy acoustic requirements and do not take into account other requirements such as structural, safety or other considerations. These additional considerations may require the glazing thickness to be increased beyond the acoustic requirement. It is noted that no skylights are nominated on the drawings. Where windows are not nominated they shall be standard glazing without acoustic seals.

Table 3 - Recommended Glazing

Lot	Facade	Room	Glazing	Seals
104	Shorline Avenue	Living	4mm float	No
		Bedroom	4mm float	No
	Northern and Southern	All	4mm float	No
	Western	All	Standard Glazing	No

In addition to meeting the minimum glazing thickness requirements given, the design of the window mullions, perimeter seals and the installation of the windows/doors in the building openings shall not reduce the STC rating of the glazing assembly below the values nominated in Table 4. Note that mohair type seals will not be acceptable for the windows requiring acoustic seals.

Table 4 - Minimum STC of Glazing

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
Standard Glazing	No	20
4mm float	No	22

The window/door suppliers should provide evidence that the systems proposed have been tested in a registered laboratory with the recommended glass thicknesses and comply with the minimum STC requirements listed in Table 4. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

5.2 ENTRY DOORS

Apartment entry doors will require no additional acoustic treatment.

5.3 ROOF/ CEILING CONSTRUCTIONS

Proposed external roof / ceilings constructed from concrete will be acoustically satisfactory for rail traffic noise intrusion.

5.4 EXTERNAL WALLS

Proposed external concrete wall elements will be acoustically satisfactory for rail traffic noise intrusion.

6. RAILWAY VIBRATION

Trains induce ground borne vibration that is transmitted through the subsoil. This vibration can be perceptible close to railways.

6.1 OBJECTIVES

6.1.1 Consent Conditions

The RIC's and SRA's Interim Guidelines recommend that habitable rooms should comply with the criteria in British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)".

6.1.2 Project Criteria

British Standard BS 6472:1992 "Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)" is recommended by the RIC's and SRA's Interim Guidelines for Councils "Consideration of rail noise and vibration in the planning process" as this standard includes guidance for the assessment of human response to building vibration including intermittent vibrations such as that caused by trains.

Human response to vibration has been shown to be biased at particular frequencies, which are related to the orientation of the person. This standard provides curves of equal annoyance for various orientations. These curves are applied as correction filters such that an overall weighted acceleration level is obtained. As the orientation of the resident is unknown or varying the weighting filter used is based on the combined base curve as given in ISO 2631 & Australian Standard 2670 "Evaluation of Human Exposure to Vibration and Shock in

Buildings (1 to 80Hz)" which represents the worst case of the X, Y and Z axes. Filtered measurements are made in all three co-ordinate axes and the highest value axis used.

This standard assesses the annoyance of intermittent vibration by using the Vibration Dose Value (VDV). Alternatively the VDV may be estimated by the eVDV which is derived by a simpler calculation using an empirical factor. The VDV or eVDV is calculated for the two periods of the day being the "Daytime" (6am-10pm) and "Night time" (10pm-6am). The overall value is then compared to the levels in Table 5. For this project the aim will be for a low probability of adverse comment.

Table 5 – Vibration Dose Values (m/s$^{1.75}$) above which various degrees of adverse comment may be expected in residential buildings.

Place	Low Probability of adverse comment	Adverse comment possible	Adverse comment probable
Residential buildings 16hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8hr night	0.13	0.26	0.51

6.2 RAIL TRAFFIC VIBRATION MEASUREMENTS

6.2.1 Measurement Location

Rail vibration measurements were conducted in line with the proposed Walker Street facades for Lot 100 which is nearest to the railway lines. This location is approximately 90m closer to the rail tracks than the Shoreline Avenue façade for Lot 104, therefore any vibration experienced from the rail tracks will be lower for Lot 104. Compliance of vibration criteria at Lot 100 will mean compliance for Lot 104.

6.2.2 Time of Measurements

Manned measurements were conducted on 1 December 2005.

6.2.3 Measurement Equipment

Svan 912 AE Sound Analyser was used for the vibration measurements. The analyser was connected to a SV08 four channel input module fitted with a Dytran triaxial accelerometer.

6.2.4 Measurement results: Vibration Dose Values

The maximum train passby ground vibration acceleration, the typical passby period (gained from both the noise and vibration measurements) and the estimated number of train passbys were used calculate the overall VDV values for each period of the day. The results are presented in Table 6

Table 6 – Vibration Dose Values

Time Period	Calculated VDV m/s$^{1.75}$	Criteria VDV m/s$^{1.75}$	Complies
Day (6am – 10pm)	0.07	0.2 to 0.4	Yes
Night (10pm -6am)	0.06	0.13	Yes

The Vibration Dose Values were found to be within acceptable levels for Lot 104

7. CONCLUSION

This report provides the results of an assessment train noise and vibration intrusion into the proposed residential development at Lot 104 in Precinct C, Rhodes Peninsula.

Noise and vibration levels at the site have been measured and assessed in accordance with the requirements of Rail Infrastructure Corporation requirements. Provided the recommendations in the report are implemented the proposed development will comply with the nominated assessment criteria.

We trust this information is satisfactory. Please contact us should you have any further queries.

Report prepared by,

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