MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS
MATTHEW SHIELDS
BEN WHITE

St Patrick's, Kogarah

Traffic Noise Intrusion Assessment

SYDNEY
A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au
ABN: 11 068 954 343

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1 INTRODUCTION

This report presents our assessment of road traffic noise impacts on the proposed St Patrick's Green development, a Residential Aged Care Facility development on the Princes Highway, Kogarah.

In this report we will:

- Review traffic noise impact planning controls applicable tot eh site.
- Provide recommendations regarding building shell construction to reduce external traffic noise to complaint levels to ensure a reasonable level of amenity for future occupants.

The assessment is based on the architectural drawings provided by Greengate Design Pty Ltd with drawing names/numbers as below:

Table 1 – Architectural Drawings for Assessment

Drawing Name	Drawing Number / Revision	Dated
Basement 2 Plan	SK01 / A	10/10/2012
Basement 1 Plan	SK02 / A	10/10/2012
Ground Plan	SK03 / A	10/10/2012
Level 1 Plan	SK04 / A	10/10/2012
Level 2 Plan	SK05 / A	10/10/2012
Level 3 Plan	SK06 / A	10/10/2012
Level 4 Plan	SK07 / A	10/10/2012
Level 5 Plan	SK08 / A	10/10/2012
Level 6 Plan	SK09 / A	10/10/2012
Level 7 Plan	SK10 / A	10/10/2012
Level 8 Plan	SK11 / A	10/10/2012
Sections	SK13 / A	10/10/2012

2 SITE DESCRIPTION

The project involves the development of a multi-level residential aged care facility (RACF) apartment building located at in the St George Private Hospital precinct, Kogarah with residential apartments facing Princes Highway to the East and residential apartments facing Chapel St to the West.

Princes Highway is a six lane arterial road with heavy volumes of traffic. Chapel Street is a two lane local road with low traffic volumes however due to St Patrick's Primary School located to the north of the site, traffic volumes can tend to increase.

The developments consists of 3 buildings (refer to appendix 1 for building identification) of varying heights. Buildings closer to the Highway will provide some level of noise screening tot eh buildings behind.

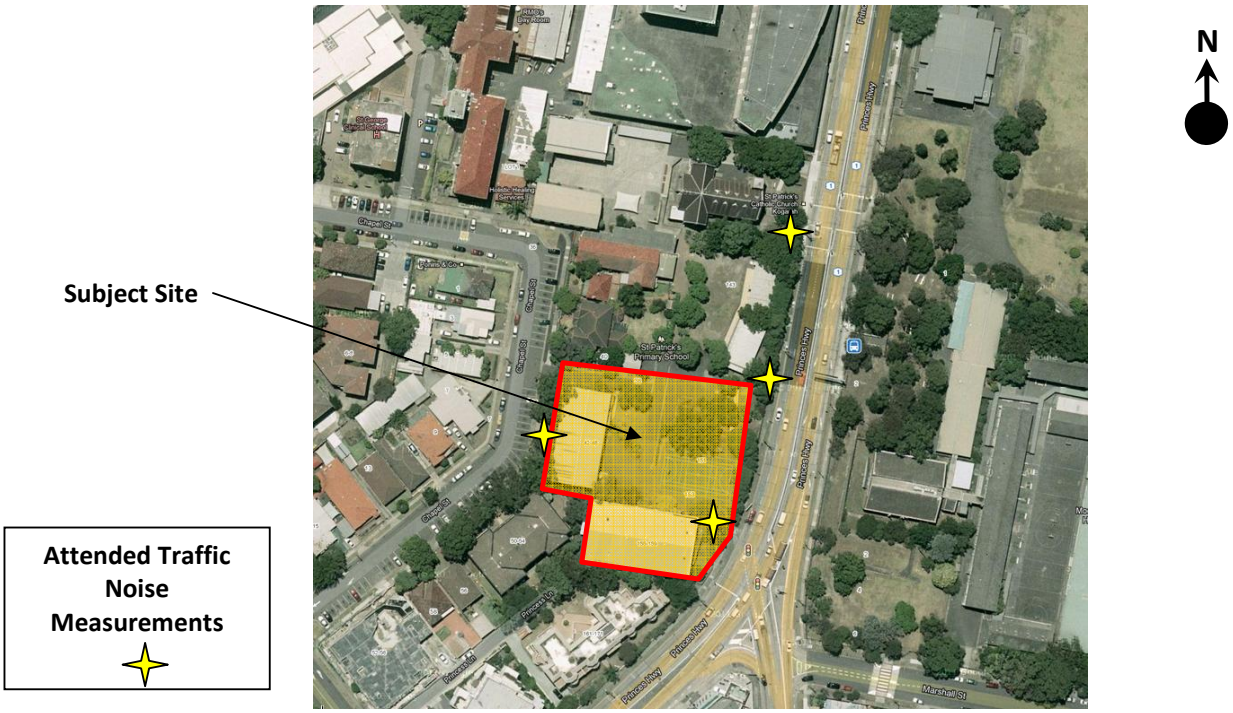

Figure 1 – Site Description: St Patrick's Green, Kogarah

3 NOISE DESCRIPTORS

Traffic noise constantly varies in level, due to fluctuations in traffic speed, vehicle types, road conditions and traffic densities. Accordingly, it is not possible to accurately determine prevailing traffic noise conditions by measuring a single, instantaneous noise level. To accurately determine the effects of traffic noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters. These parameters are used to measure how much annoyance would be caused by a particular noise source.

In the case of environmental noise three principle measurement parameters are used, namely L_{10}, L_{90} and L_{eq}.

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals. The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced at the source. Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source will depend on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; like traffic noise.

This section of the report details the acoustic assessment of traffic noise intrusion onto the proposed development.

As the railway line is located underground, airborne noise impacting the site will be as a result of noise emission from traffic movements alone. Structure borne noise resulting from the rail vibrations are outlined in the subsequent section.

4 ACOUSTIC CRITERIA

4.1 KOGARAH COUNCIL DEVELOPMENT CONTROL PLAN 1996

Section 3.9, Part 3, of the Kogarah Council DCP directly addresses the acoustic criteria for multi-unit residential developments along Princes Highway, Kogarah.

3.9.1 An Acoustic Assessment is to be submitted outlining how the proposed development complies with the requirements of Clause 102(3) of the Infrastructure SEPP. In preparing the Acoustic Assessment reference is to be made to the NSW Department of Planning's publication Development near Rail Corridors and Busy Roads – Interim Guidelines and the relevant Australian and International Standards (as amended).

4.2 STATE ENVIRONMENTAL PLANNING POLICY (SEPP INFRASTRUCTURE) 2007

The Kogarah Council DCP refers directly to the SEPP infrastructure development guidelines. Clause 102 of the NSW SEPP for rod traffic noise stipulates,

"This clause applies to development for any of the following purposes that is on land in or adjacent to the road corridor for a freeway, a tollway or a transit way or any other road with an annual average daily traffic volume of more than 40,000 vehicles (based on the traffic volume data published on the website of the RTA) and that the consent authority considers is likely to be adversely affected by road noise or vibration:

(a) a building for residential use,

If the development is for the purposes of a building for residential use, the consent authority must not grant consent to the development unless it is satisfied that appropriate measures will be taken to ensure that the following L_{Aeq} levels are not exceeded:

(a) in any bedroom in the building – 35 dB(A) at any time between 10 pm and 7am,

(b) anywhere else in the building (other than a garage, kitchen, bathroom or hallway) – 40 dB(A) at any time."

Map 15 of the traffic volume maps for the Infrastructure SEPP on the RTA website (see below), classifies Princes Highway as a road with > 40,000 AADT and hence mandatory under clause 102 of the State Environmental Planning Policy (SEPP Infrastructure) 2007.

Figure 2 – Traffic Volume Map (SEPP Infrastructure)

4.3 PROJECT CRITERIA SUMMARY

A summary of the projects internal noise level criteria incorporating all relevant legislative requirements are detailed in the table below.

Table 2 – Internal Noise Level Summary

Space /Activity Type		Project Internal Noise Level Criteria (SEPP)
Residential	Sleeping Areas	35 dB(A) $L_{eq\ (9\ hr)}$
	Living Areas	40 dB(A) $L_{eq\ (15\ hr)}$

4.4 NOISE MEASUREMENTS

External noise levels in the area have been recorded by this office using long term unattended noise monitoring equipment and attended short term measurements.

Long term monitoring was conducted using an Acoustic Research Laboratories noise monitor set to A-weighted fast response. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted.

Short term noise measurements were conducted using a SVAN-958 Sound Analyser. The analyser was set to fast response and calibrated before and after the measurements using a Rion NC-73 calibrator. No significant drift was noted.

The traffic noise levels listed in the table below, were determined based on the logging data and attended measurements. In determination of acoustic treatments, the measured level is adjusted for distance and orientation.

Table 3 – Traffic Noise Measurements

Location	Measured Level
Princes Highway (3m from curb)	70dB(A) $L_{eq(15min)}$
Chapel St (4m from curb)	60dB(A) $L_{eq(15min)}$

4.5 EVALUATION OF NOISE INTRUSION

Internal noise levels will primarily be as a result of noise transfer through the windows and doors and roof, as these are relatively light building elements that offer less resistance to the transmission of sound. **All external walls are proposed to be heavy masonry elements that will not require upgrading.**

The predicted noise levels through the windows, doors and roof are discussed below. The predicted noise levels have been based on the measured level and spectral characteristics of the external noise (traffic noise on Princes Hwy and Chapel St), the area of building elements exposed to traffic noise, the absorption characteristics of the rooms and the noise reduction performance of the building elements.

Calculations were performed taking into account the orientation of windows, barrier effects (where applicable), the total area of glazing, facade transmission loss and the likely 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.

In addition, analysis takes into account the shielding effects of one building on another.

4.5.1 Recommended Glazing

The following tables list the recommended glazing assemblies for this project to achieve the internal traffic noise requirements. All external windows and doors listed are required to be fitted with Q-lon type acoustic seals. (**Mohair Seals are unacceptable**). 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. In such cases, thicker glazing is acoustically acceptable.

The following tables refer to building 1, building 2 and building 3. See the appendix 1 for identification of building numbers used in the tables below.

Table 4 – Recommended Glazing Construction – Building 1

Façade	Level	Room Type	Glazing Requirement	Acoustic Seals
East (Princes Highway)	Ground Floor	Bedrooms	10mm* Or 10mm/12mm airgap/6mm IGU	Yes
	Remaining levels.	Bedrooms	10.38mm laminated Or 10.38mm/12mm airgap/6mm IGU	Yes
North/South	All	Bathrooms	4mm Or IGU as required for thermal purposes.	Yes
West	All	Bedrooms	6mm Or 6mm/12mm airgap/6mm IGU	Yes
		Living Rooms	6mm Or 6mm/12mm airgap/6mm IGU	No

*Provided existing fence along eastern boundary of site remains.

Table 5 – Recommended Glazing Construction – Building 2

Façade	Level	Room Type	Glazing Requirement	Acoustic Seals
East (Princes Highway)	All	Bedrooms	10.38mm laminated Or 10.38mm/12mm airgap/6mm IGU	Yes
North/South	All	Bedrooms – Easternmost 3 bedrooms	10mm Or 10mm/12mm airgap/6mm IGU	Yes
		Remaining 3 bedrooms	6.38mm laminated Or 6.38mm/12mm airgap/6mm IGU	Yes
		Bathrooms	4mm Or IGU as required for thermal purposes.	Yes
West	All	Bedrooms	6mm Or 6mm/12mm airgap/6mm IGU	Yes
		Living Rooms	6mm Or 6mm/12mm airgap/6mm IGU	No

Table 6 – Recommended Glazing Construction – Building 3

Façade	Level	Room Type	Glazing Requirement	Acoustic Seals
East (Princes Highway)	GF to Lev 2	Bedrooms	6mm Or 6mm/12mm airgap/6mm IGU	Yes
	Lev 3 and Above		6.38mm laminated Or 6.38mm/12mm airgap/6mm IGU	Yes
	GF to Lev 2	Living Rooms	6mm Or 6mm/12mm airgap/6mm IGU	Yes
	Lev 3 and Above		6mm Or 6mm/12mm airgap/6mm IGU	Yes
North	All	Bedrooms	6.38mm laminated Or 6.38mm/12mm airgap/6mm IGU	Yes
		Living Rooms	6mm Or 6mm/12mm airgap/6mm IGU	Yes
West (Chapel St)	All	Bedrooms/ Living Rooms	6mm Or 6mm/12mm airgap/6mm IGU	Yes

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 the tables above. **Note: Mohair type seals will not be acceptable for the windows requiring acoustic seals.**

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 listed STC requirements. Also, the glazing installer should certify that the window/doors have been constructed and installed in a manner equivalent to the tested samples.

Table 7 - Minimum STC of Glazing (with Acoustic Seals)

Glazing Thickness	Acoustic Seals	Minimum STC of Installed Window
4mm	Yes	27
6mm	Yes	29
6.38mm Laminated	Yes	31
10mm	Yes	33
10.38 Laminated	Yes	35

4.5.2 External Doors

Any glass door should be constructed using glazing thicknesses set out in Tables 4, 5 & 6. Full perimeter acoustic seals around the doors are required. It will be acoustically acceptable if thicker glazing is required for structural or comfort purposes, the glazing recommended is a minimum requirement for glass doors.

4.5.3 Roof / Ceiling Construction

The recommended roof/ceiling construction is shown in Figure 3 below. Penetrations in all bedrooms (such as light fittings etc.) must be acoustically treated and sealed gap free with a flexible sealant.

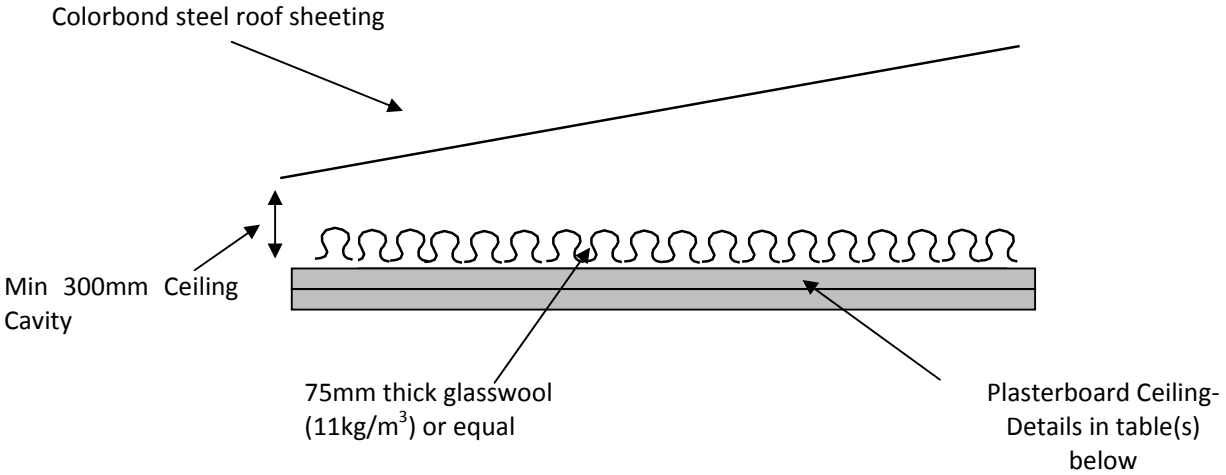

Figure 3 – Roof / Ceiling Construction

Table 8 – Top Level Ceiling – Building 1

Room	Room	Ceiling Construction	Ceiling Cavity
All Top Level Apartments	All Bedrooms	2 layers of 10mm plasterboard	Min 75mm Thick Glasswool
	Lounge	1 layer of 13mm plasterboard	Min 75mm Thick Glasswool

Table 9 – Top Level Ceiling – Building 2

Room	Room	Ceiling Construction	Ceiling Cavity
All Top Level Apartments	All Bedrooms	2 layers of 10mm plasterboard	Min 75mm Thick Glasswool
	Lounge	1 layer of 13mm plasterboard	Min 75mm Thick Glasswool

Table 10 – Top Level Ceiling – Building 3

Room	Room	Ceiling Construction	Ceiling Cavity
All Top Level Apartments	All Rooms	1 layer of 13mm plasterboard	Min 75mm Thick Glasswool

4.5.4 External Walls

External walls of masonry construction do not require any acoustic upgrading. There should not be vents on the internal skin of external walls. All penetrations in the internal skin of external walls should be acoustically sealed.

4.5.5 Mechanical Ventilation

As internal noise levels cannot be achieved with windows open it is required that an alternative outside air supply system or air conditioning be installed in accordance with AS 1668.2 requirements. The mechanical ventilation system that is installed should be acoustically designed such that the acoustic performance of the recommended constructions are not reduced by any duct or pipe penetrating the wall/ceiling/roof. Noise emitted to the property boundaries by any ventilation system shall comply with relevant Council requirements.

5 CONCLUSION

This report provides the results of our assessment of traffic noise impacts on the amenity of future tenants within the proposed residential development at St Patrick's Green, Kogarah.

Provided that the treatments set out in Section 4.5 of this report are employed, internal noise levels shall comply with the requirements of the Kogarah Council DCP and Clause 102 of the NSW SEPP.

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

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Jeff Robinson

6 APPENDIX 1

notes

All dimensions and setouts to be verified prior to commencement, omissions or discrepancies to be immediately notified to the architect.

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architect
GREENGATE DESIGN PTY LTD
Level 1/156 Gloucester Street, Sydney, NSW 2000 Australia
Nominated Architect: Andrew Sweeney 6972 (NSW)
t: 61 2 9256 5615

project name
ST PATRICK'S GREEN
Kogarah
?? St
Kogarah, NSW

client
GREENGATE DEVELOPMENT PTY LTD
Level 1, 156 Gloucester Street
Sydney NSW 2000
t: 61 2 9256 5600

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