MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS
MATTHEW SHIELDS
BEN WHITE

St Marys Leagues Club - New Hotel

Development Application Acoustic Report

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

DOCUMENT CONTROL REGISTER

Project Number	20160597.1
Project Name	St Marys Leagues Club - New Hotel
Document Title	Development Application Acoustic Report
Document Reference	20160597.1/2804A/R1/TA
Issue Type	Email
Attention To	FDC Construction & Fitout Pty Limited Marcos Salvati

Revision	Date	Document Reference	Prepared By	Checked By	Approved By
0	28/04/2016	20160597.1/2804A/R0/TA	TA		TA
1	28/04/2016	20160597.1/2804A/R1/TA	TA		TA

TABLE OF CONTENTS

1 INTRODUCTION

This report presents an analysis of acoustic impacts associated with proposed hotel to be located at St Marys Leagues Club.

This report will:

- Conduct an external noise impact assessment (primarily traffic noise and club noise) and recommend acoustic treatments to ensure compliance with AS2107:2000.

- Identify potential noise sources generated by the site, and determine noise emission goals for the development to meet Council acoustic requirements to ensure that nearby developments are not adversely impacted.

This report has been prepared based on architectural drawings DA100 – DA107 dated April 2016 prepared by WMK architects.

2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The proposed Hotel is to be located on the eastern side of the Club.

The southern façade of the site face Boronia Road which currently carries low volumes of traffic. Further to the south, across Boronia Road is the nearest potentially affected residential development and a residential aged care facility which is currently under construction. The main source of noise impact towards the proposed Hotel is the low level noise from cars currently using the St Mary's Leagues Club and operational noise from the Club itself. Forrester Road is to the west of the site which carries medium to high traffic volumes.

The proposed hotel is 6 storeys in height with ancillary Hotel spaces on the ground and first floors. Figure 1 details the existing development, the proposed Hotel and noise measurement positions.

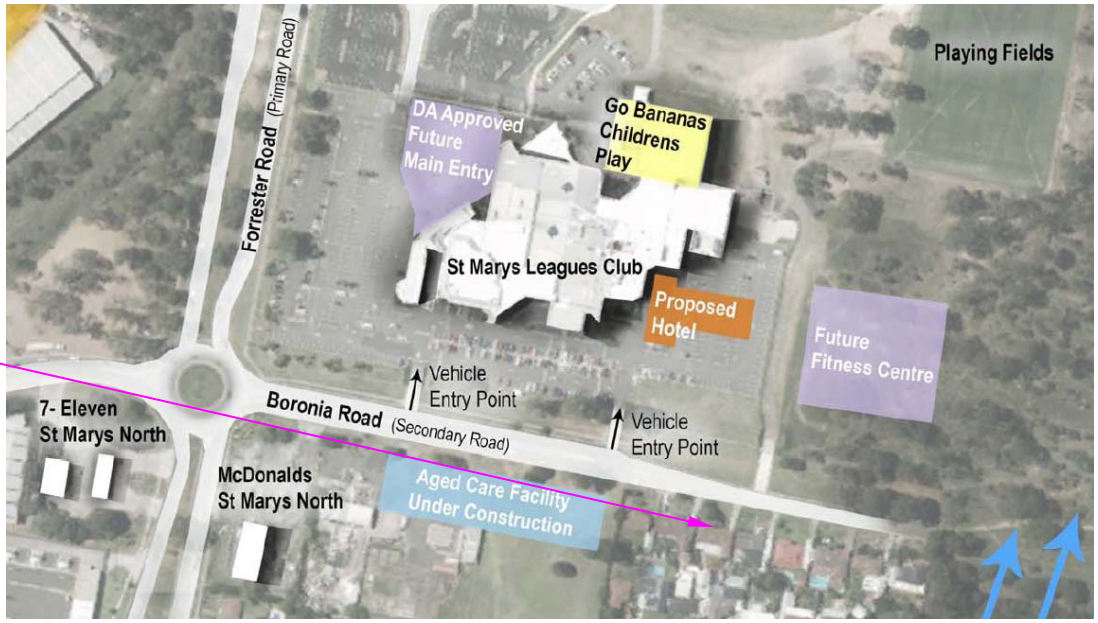


Figure 1 – Site Map

3 NOISE INTRUSION ASSESSMENT

3.1 ASSESSMENT CRITERIA

3.1.1 Hotel Spaces

As the development is not a residential use and is not subject to SEPP criteria, the requirements of Australian Standard 2107:2000 have been adopted. It is noted that compliance with AS2107:2000 criteria will result in compliance with the State Environmental Planning Policy (SEPP Infrastructure) 2007. Australian Standard AS2107-2000 "Recommended Design Sound Levels and Reverberation Times for Building Interiors" recommends maximum design sound levels for different areas of occupancy in the residential development while AS 3671 -1989 "Road Traffic Noise Intrusion - Building Siting and Construction" recommends that an appropriate L_{eq} or L_{10} traffic noise descriptor be used for the occupancy being assessed. Traffic noise criteria for AS2107-2000 is presented in the table below, based on developments near major roadways.

3.2 RESULTING CRITERIA

Pursuant to this, the following combination of assessment criteria would apply to the proposed hotel for traffic and light rail noise intrusion and rooms have been assessed to comply with all sets of internal noise criteria.

Table 1 - Internal Noise Level Criteria

LOCATION	CRITERIA
Hotel Rooms	35dB(A) $L_{eq(9\ Hour)}$
Ancillary Spaces	50dB(A) $L_{eq\ (9\ hour)}$

3.3 NOISE DESCRIPTORS

Traffic and environmental 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 interval.

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 by 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; such is the character of traffic noise.

Current practice favours the L_{eq} parameter as a means of measuring traffic noise, whereas the L_{10} parameter has been used in the past and is still incorporated in some codes. For the reasons outlined above, the L_{90} parameter is not used to assess traffic noise intrusion.

3.4 NOISE MONITORING

Long term monitoring of background and traffic noise was conducted using a noise monitor installed on site at 177 Boronia Road, St Marys.

Monitoring was conducted from the 14th to the 22nd May 2013 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. Noise logger data is provided in Appendix 1.

Attended noise measurements of the surrounding ambient environment (traffic, etc) were conducted on the 21st of April 2016 to supplement the long term monitoring.

Table 2 Measured Noise Levels

Descriptor	Daytime (7am-6pm)	Night time (10pm-7am)
Façade noise level	56dB(A) $L_{eq\ 1\ Hour}$	51 $L_{eq\ 1\ Hour}$

4 EXTERNAL NOISE INTRUSION

4.1 EVALUATION OF NOISE INTRUSION

Internal noise levels will primarily be as a result of noise transfer through the windows 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, 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.

4.1.1 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.

Table 3 – Recommended Glazing Construction

Façade	Level	Room	Recommended Glazing	Acoustic Seals
All	All	Hotel sleeping areas	6mm glass	Yes

Table 4 – Recommended Glazing Construction – Retail

Area	Level	Recommended Glazing	Acoustic Seals
Ancillary Spaces	All	6mm glass	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 table above. **Note that 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 5 - Minimum STC of Glazing (with Acoustic Seals)

Glazing Assembly	Acoustic Seals	Minimum STC of Installed Window
6mm	Yes	29

4.1.2 External Doors

Any glass door should be constructed using glazing thickness set out in Table 3 and 4. 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 in Table 3 and 4 is a minimum requirement.

4.1.3 Roof / Ceiling Construction

The roof is to be constructed from concrete. This roof will not require upgrading to achieve AS2107:2000 acoustic requirements.

4.1.4 External Walls

External walls are to be comprised of concrete or masonry elements and will not require acoustic upgrading.

In the event that lightweight external wall panelling is proposed, detailed acoustic review will be required at CC stage to ensure that the contribution of noise ingress via the lightweight façade elements does not result in excessive noise levels within the room.

5 NOISE EMISSION ASSESSMENT

The following potential noise emission sources have been identified for the Hotel:

- Use of the existing approved car park; and
- Mechanical plant;

Noise emissions from these sources are addressed in this Section.

5.1 BACKGROUND NOISE MONITORING

Long term noise monitoring has been conducted on Boronia Road (see figure 1).

Monitoring was conducted from the 14th to the 22nd May 2013. Monitoring was conducted using an Acoustic Research Laboratories unattended noise monitor. The noise monitors continuously monitor noise levels. Every 15 minutes the monitor stores statistical noise descriptors for the interval. At the end of the measurement period the stored data is downloaded onto computer for analysis. The noise monitors were calibrated at the start and end of each measurement period using a Rion NC-73 Calibrator. No significant drift in calibration occurred.

The measured background noise levels have been corrected for meteorological conditions (excessive wind and/or rain), as required by section 3.4 of the EPA Industrial Noise Policy. Exceedances of the 5m/s average wind speed limit of the EPA were noted and corrected for in determining the background noise levels. These areas are noted in the logging data in Appendix 1.

Periods of adverse weather have been eliminated when determining the rating background noise level at the site, which are presented below.

Table 6 - Measured Background Noise Levels

Time of Day	Background Noise Level (dB(A)L_{90})
Daytime (7am-6pm)	43
Evening (6pm-10pm)	44
Night (10pm-7am)	40

5.2 NOISE EMISSION CRITERIA

Noise impacts should comply with the requirements of the Penrith Council DCP.

In accordance with the Penrith City Council DCP 2010, noise emissions from the use of the site will be managed in accordance with the NSW Environmental Protection Authority (EPA) Industrial Noise Policy (INP).

5.2.1 NSW EPA Industrial Noise Policy

The recommended assessment objectives vary depending on the potentially affected receivers, the time of day, and the type of noise source. The EPA Industrial Noise Policy has two

requirements which both have to be complied with, namely an amenity criterion and an intrusiveness criterion.

5.2.2 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5 dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

5.2.3 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment. The EPA's Industrial Noise Policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. Table 2 provides the recommended maximum noise levels for the suburban residential receivers for the day, evening and night periods. For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;
- Evening is defined as the period from 6pm to 10pm; and
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays.

Table 7 - EPA Recommended Acceptable Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A)L_{eq}	
		Recommended	Maximum
Residential - Suburban	Day	55	60
	Evening	45	50
	Night	40	45

5.2.4 Summary of EPA Noise Assessment Objectives

The following table presents the summary of noise emission objectives applicable to the site.

Table 8 - Noise Objectives for Residential Receivers, dB(A)

Time of day	Measured Background Noise Level dB(A) L_{90}	Amenity (recommended) Criteria dB(A) L_{eq}	Intrusiveness Criteria Background + 5 dB(A) L_{eq}
Day	43	55	48
Evening	44	45	49
Night	40	40	45

5.2.5 Sleep arousal assessment (Car Park)

Sleep arousal is a function of both the noise level and the duration of the noise.

In accordance with the Industrial Noise Policy, to assess potential sleep arousal impacts a two stage test is carried out:

- Step 1 - An "emergence" test is first carried out. That is, the L_1 noise level of any specific noise source should not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am. If the noise events are within this, then sleep arousal impacts are unlikely and no further analysis is needed. This is consistent with the Noise Guide for Local Government. The guideline level is set out below.

Table 9– Sleep Arousal Emergence Criteria

Location	Background Noise Level dB(A)L_{90}	Emergence Level dB(A) $L_{1(1min)}$
All Potentially Affected Residential Properties	40 (6am-7am)	55

- Step 2 - If there are noise events that could exceed the emergence level, then an assessment of sleep arousal impact is required to be carried out taking into account the level and frequency of noise events during the night, existing noise sources, etc. This test takes into account the noise level and number occurrences of each event with the potential to create a noise disturbance. As is recommended in the explanatory notes of the EPA Industrial Noise Policy, this more detailed sleep arousal test is conducted using the guidelines in appendix B of the EPA Environmental Criteria for Road Traffic Noise. Appendix B states that maximum internal noise levels below 50–55dBA are unlikely to cause awakening reactions, and that one or two noise events per night with maximum internal noise levels of 65–70 dBA are not likely to affect health and wellbeing significantly. For the purposes of this assessment, a maximum internal noise goal of 55dB(A) has been adopted.

5.2.6 Noise From Increased Traffic Generation on Public Streets

For land use developments with the potential to create additional traffic the development should comply with the requirements for new developments detailed in the EPA Road Noise Policy.

Noise levels generated by traffic should not exceed the noise levels set out in the table below when measured at a nearby property.

Table 10 - Criteria for Traffic Noise Generated by New Developments

Time of day	Criteria for Acceptable Traffic Noise Level Local Roads
Day (7am to 10pm)	55 $L_{Aeq(1hr)}$
Night (10pm to 7am)	50 $L_{Aeq(1hr)}$

However, if existing noise levels exceed those in the table above, the new development must not cause an increase noise of more than 2 dB.

5.3 OPERATIONAL NOISE ASSESSMENT

The operational noise emissions will be assessed below. The assessment of the following noise sources will be undertaken:

- Noise from the use of car park (vehicle manoeuvring, cars starting, doors closing) will be assessed with reference to the Industrial Noise Policy.
- Noise from mechanical services (roof top ventilation) will be assessed with reference to the Industrial Noise Policy.
- Noise from traffic generated on public roads will be assessed with reference to the EPA Road Noise Policy guidelines.

5.3.1 Car Park Noise (Average Noise)

Noise from cars driving within the car park will create a steady/quasi-steady noise which will be assessed with reference to the INP Intrusiveness/Amenity Criteria.

Predictions will be made based on the following data/assumptions:

- There will be, during a peak period, approximately 10 cars circulating within the car park at any one time as a result of the Hotel operation.
- The sound power level of a car travelling within the car park is 84dB(A) L_{eq}

Predicted levels are as follows:

Table 11 - On-Site Operational Noise Assessment – Car Park

Receiver Location	Noise Source	Predicted Noise Level – dB(A)$L_{eq(15min)}$	Acoustic Criteria dB(A)$L_{eq(15min)}$	Complies
Residential Properties to south	Car engine	<35dB(A)L_{eq}	40dB(A)L_{eq}	Yes

5.3.2 Car Park Peak Noise Events (Sleep Arousal)

It is envisaged that the car park may be used by staff or guests before the 7am period and as such, an assessment of the impact of car doors shutting has been undertaken. Car doors slamming has been measured by the office to be 90dB(A) $L_{1(1min).}$

All predictions take into account the relative position of noise source and noise receiver, distance attenuation, air absorption, adverse weather and noise screening (where appropriate).

Predicted noise levels are as follows:

Table 12 - Sleep Arousal Emergence Test

Receiver Location	Noise Source	Predicted Noise Level	Emergence Acoustic Criteria	Arousal Impact Test Required?
Residential Properties to south	Car door shutting in car park	45dB(A)$L_{1(1min)}$	55dB(A)$L_{1(1min)}$	No further assessment required

All peak noise events associated with the operation of cars within car park comply with sleep arousal goals.

5.3.3 Mechanical Services Noise

Detailed acoustic assessment of mechanical plant is not typically undertaken at DA stage as plant selections and locations are not finalised.

In particular, we note:

- Roof top plant (cooling towers or condensers) may require acoustic treatment. Treatment may consist of in-line duct treatment or fan cladding (typical).

- All plant can be satisfactorily attenuated to levels complying with noise emission crite ria through appropriate location and (if necessary) standard acoustic treatments such as noise screens, enclosures, in-duct treatments (silencers/lined ducting) or similar

We recommend that a detailed review of plant items be undertaken at Construction Certificate stage, once mechanical plant selections have been undertaken.

5.3.4 Increased Traffic on Public Streets

Vehicular access to and from the site will be via Forest Road and Boronia Road, a local road. As existing noise levels on Boronia Road exceed the recommended traffic noise level for a local road, the new development must not cause an increase noise of more than 2 dB as per the NSW Road Noise Policy.

Section 3.21 of the Colston Budd Rogers & Kafes Pty Ltd Traffic Report states that there will be an additional generation of 50 vehicles per hour two-way during peak periods. An increase of 50 vehicles during a peak time to the existing 310 vehicle movements will result in an increase of less than 1dB, which is compliant with the requirements of the NSW Road Noise Policy.

6 CONCLUSION

This report presents an assessment of potential environmental noise impact from the proposed Hotel to be located at St Marys Leagues Club.

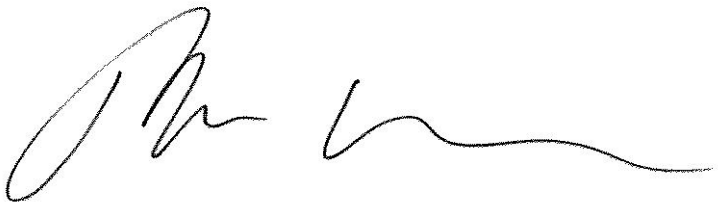
The outcomes of the assessment are as follows:

- Provided that the acoustic treatments nominated within this report are adopted noise impact on future occupants of the Hotel will comply with relevant Council and Planning NSW noise impact requirements.

- Provide that the acoustic treatments and management controls set out in section 5 of this report are adopted, noise generation by the site will comply with relevant EPA and Council noise emission controls.

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

Yours faithfully,



Acoustic Logic Consultancy Pty Ltd
Thomas Aubusson MAAS

Appendix One -

Unattended Traffic Monitoring Data