RODNEY STEVENS ACOUSTICS
Acoustic Consultants
Member Australian Acoustical Society

Proposed School – Arrahman College

95 - 105 Seventeenth Avenue, Austral NSW

Noise Management Plan

REPORT R160222R2

Revision 0

Prepared for:

Mr. Hussein Oubani

Al Mabarrat Benevolent Society

4 July 2017

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PREPARED BY:

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
R160222R2	Revision 0	4 July 2017	Desmond Raymond	Rodney Stevens	Rodney Stevens

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1 INTRODUCTION

Al Mabarrat Benevolent Society is seeking the development application for a proposed school, Arrahman College to be located at 95 - 105 Seventeenth Avenue, Austral. It is proposed to undertake a staged development of a school providing for Kindergarten - Year 12 for approximately 800 students.

Rodney Stevens Acoustics Pty Ltd (RSA) has been engaged by Al Mabarrat Benevolent Society to prepare a Noise Management Plan for the Proposed School, Arrahman College, at 95 - 105 Seventeenth Avenue, Austral NSW.

This acoustical assessment addresses the noise environment of the school and surrounding area and the potential acoustical impact on nearby residential receivers associated with the proposed development. The NSW EPA Industrial Noise Policy has been referred to for guidance in quantifying the ambient noise levels and determining criteria for the assessment of continuous operational noise emissions.

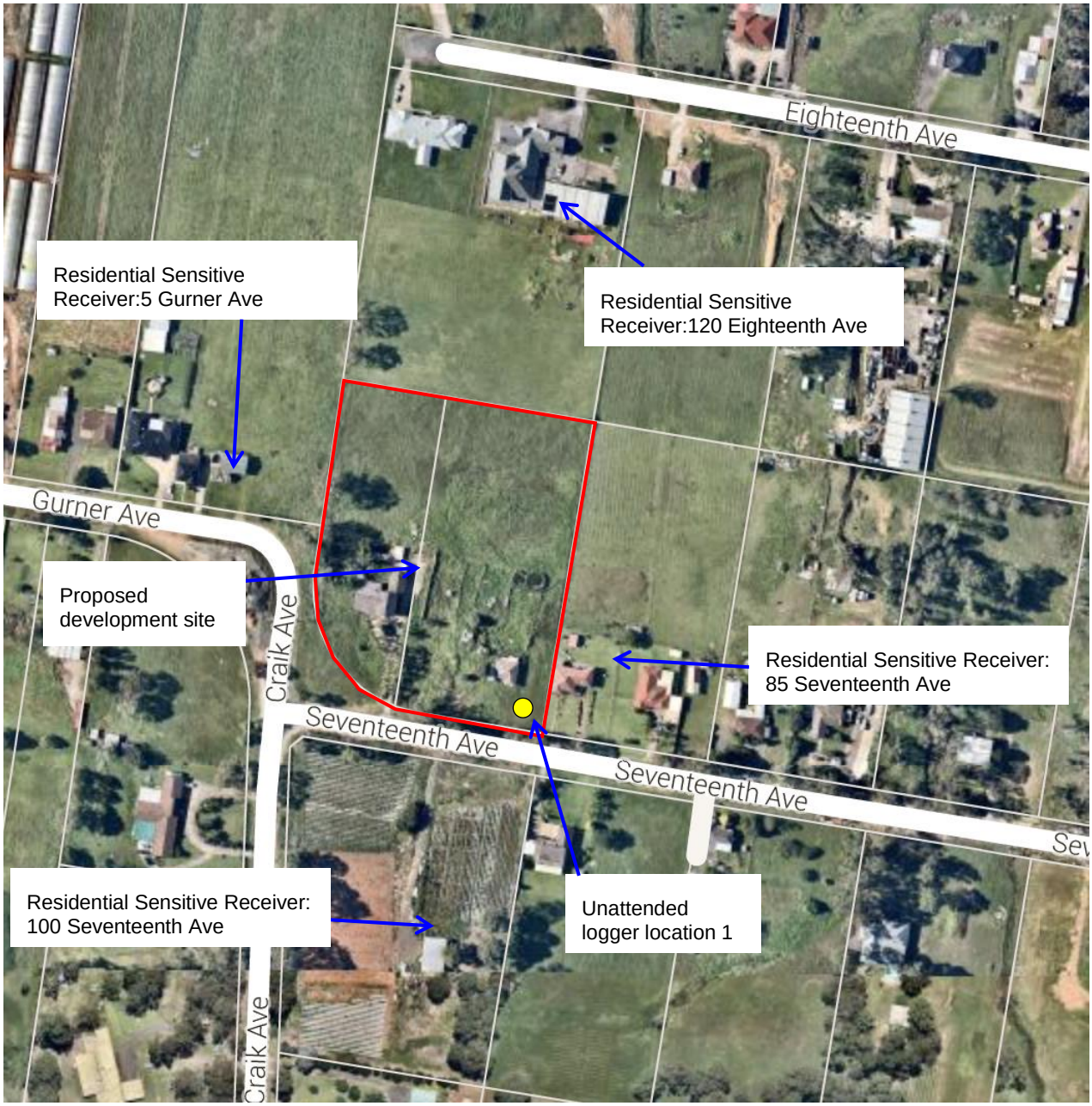
Specific acoustic terminology is used in this report. An explanation of common acoustic terms is provided in Appendix C.

2 PROJECT OVERVIEW

2.1 Project Location

The proposed development is located at 95 - 105 Seventeenth Avenue, Austral. The project area and its surrounding environment are presented in Figure 2-1 below.

Figure 2-1 Project Area and Surrounding Environment



Aerial image courtesy of © 2017 nearmap

2.2 Project Description and Site Plan

The development involves the demolition of the existing buildings on the site and the construction of several separate buildings containing classrooms, a separate administration building, an assembly building, external play areas, car parking areas accessed from Seventeenth Avenue and associated landscaping. The school buildings have been sufficiently setback from the sites frontage to Seventeenth Avenue and the corner of Craik and Gurner Avenue. Separation has also been provided from the adjoining property boundaries to accommodate landscaping. The proposed development seeks approval for the following:

- Demolition of two (2) existing dwellings and associated outbuildings on the site.
- Staged development of a school providing for kindergarten – Year 12 for up to 800 students to be achieved by 2029.

- Construction of two x 2 storey buildings associated with the primary school (Kindergarten – Y6) in the north west corner of the site and three x 2 storey buildings associated with the Secondary school in the south eastern corner of the site.
- Construction of a school assembly building.
- Provision of 58 car parking spaces for staff and visitors.
- Provision of a 16 bay pick-up/drop –off area Provision of a 3 bay bus parking area. Entry and egress to the car park from Seventeenth Avenue. Provision for external play areas.
- Before and after school services for up to 40 school aged children.

The proposed site layouts of the residential development site is presented in Figure 2-2.

Figure 2-2 Proposed Site Plan

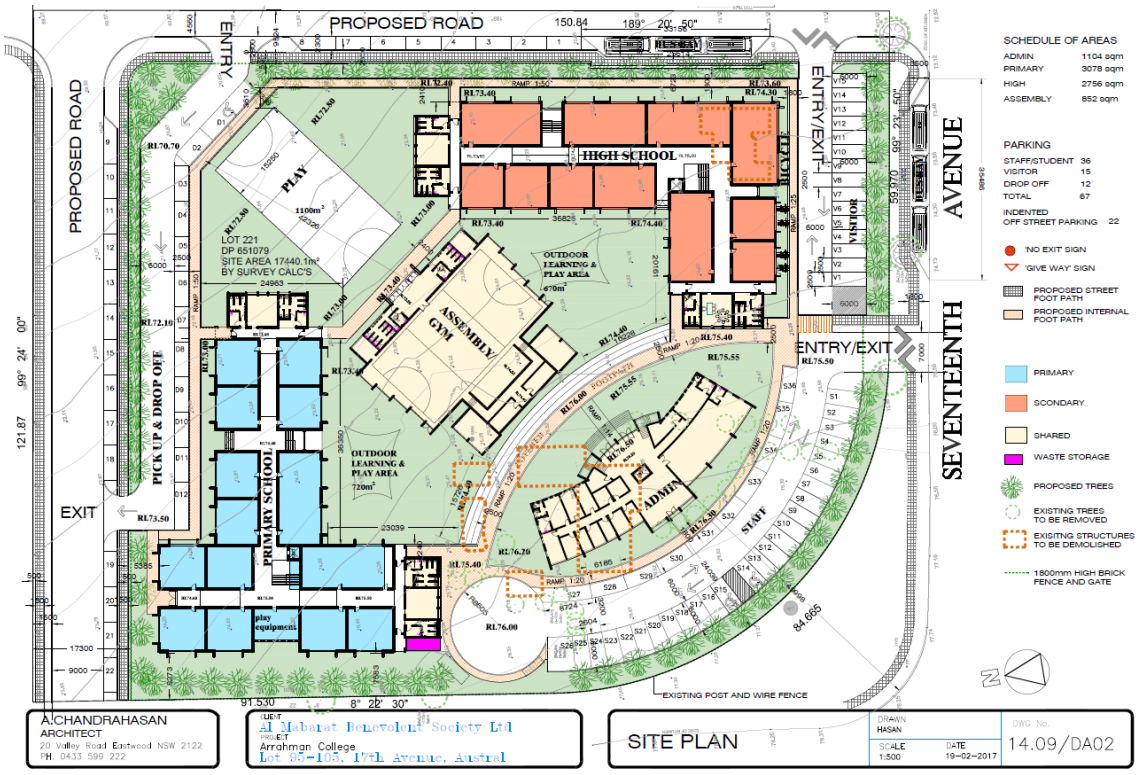


Figure 2-3 Proposed Stage 1 Plan

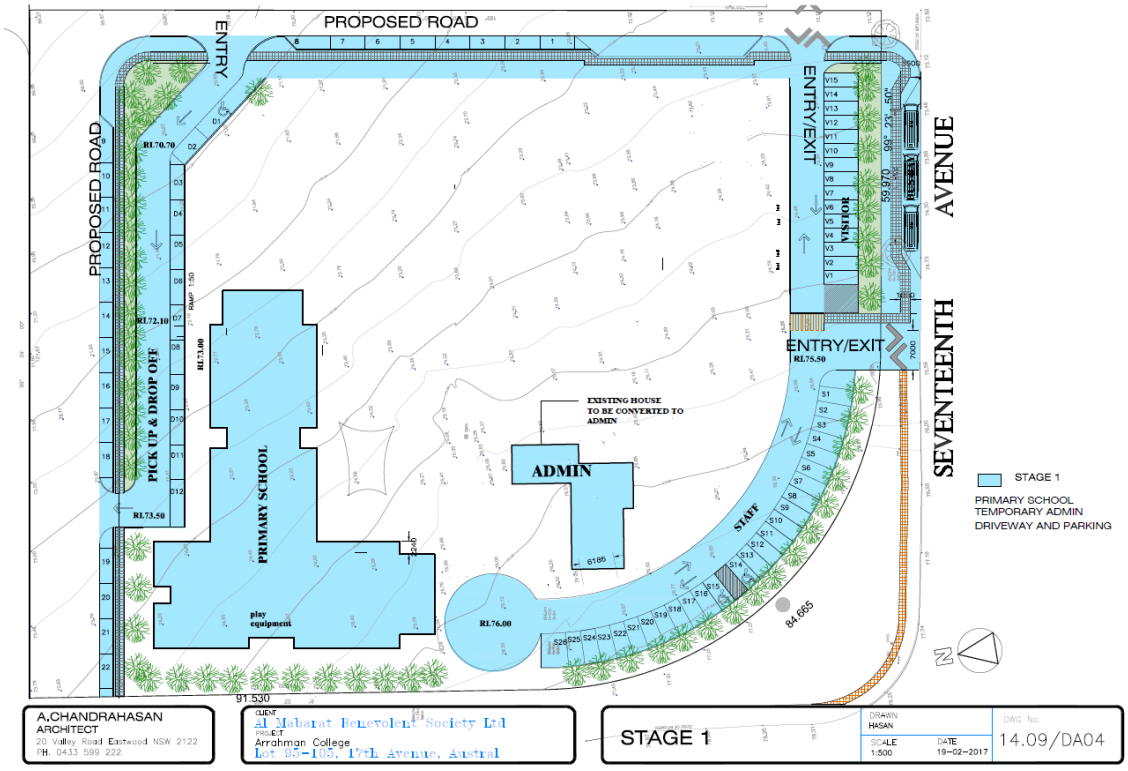


Figure 2-4 Proposed Stage 2 Plan

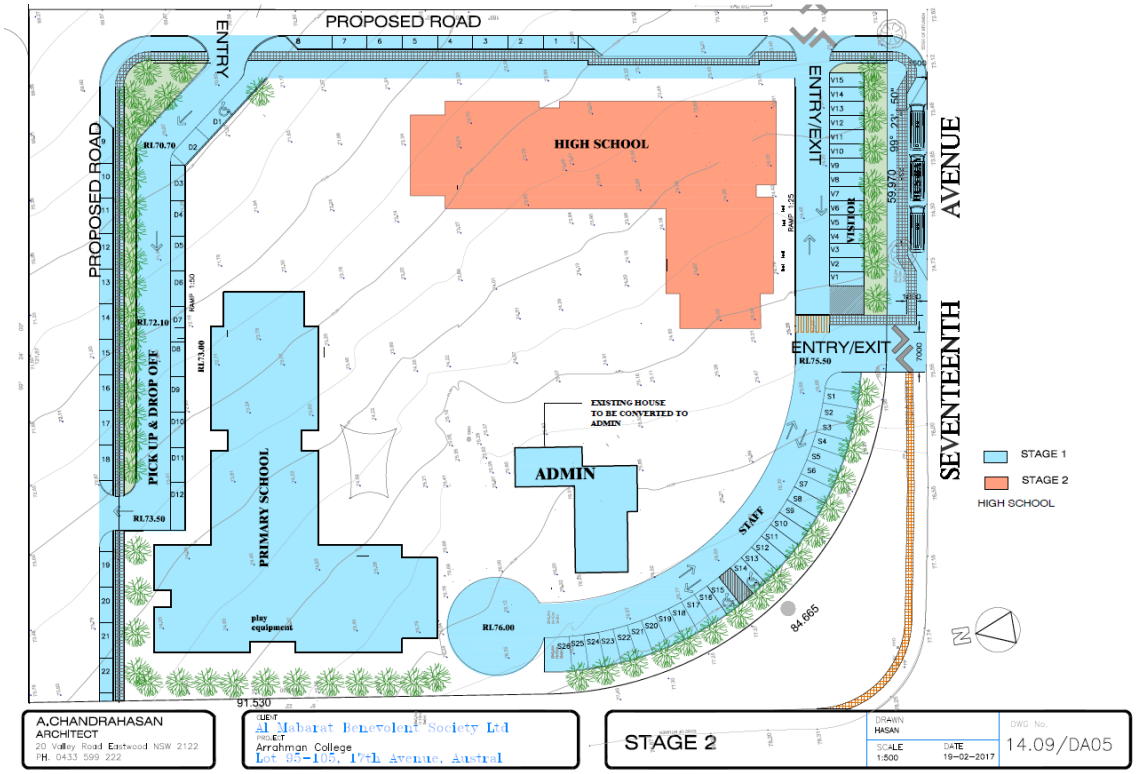


Figure 2-5 Proposed Stage 3 Plan

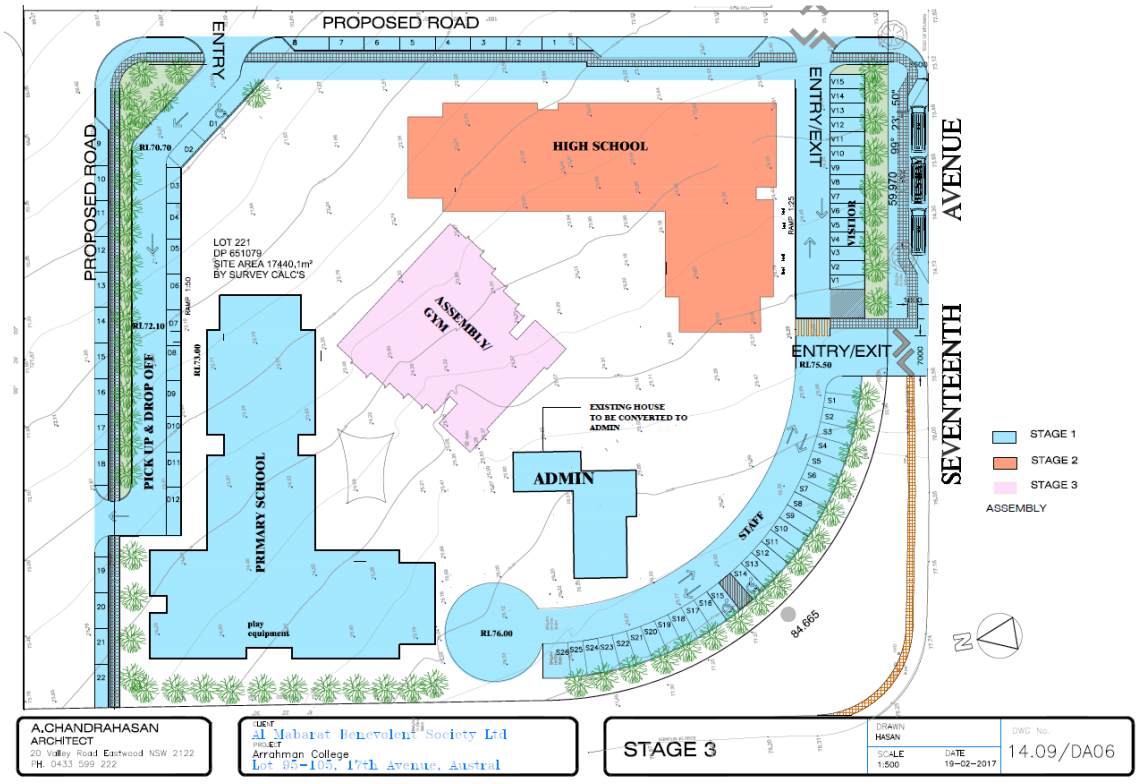
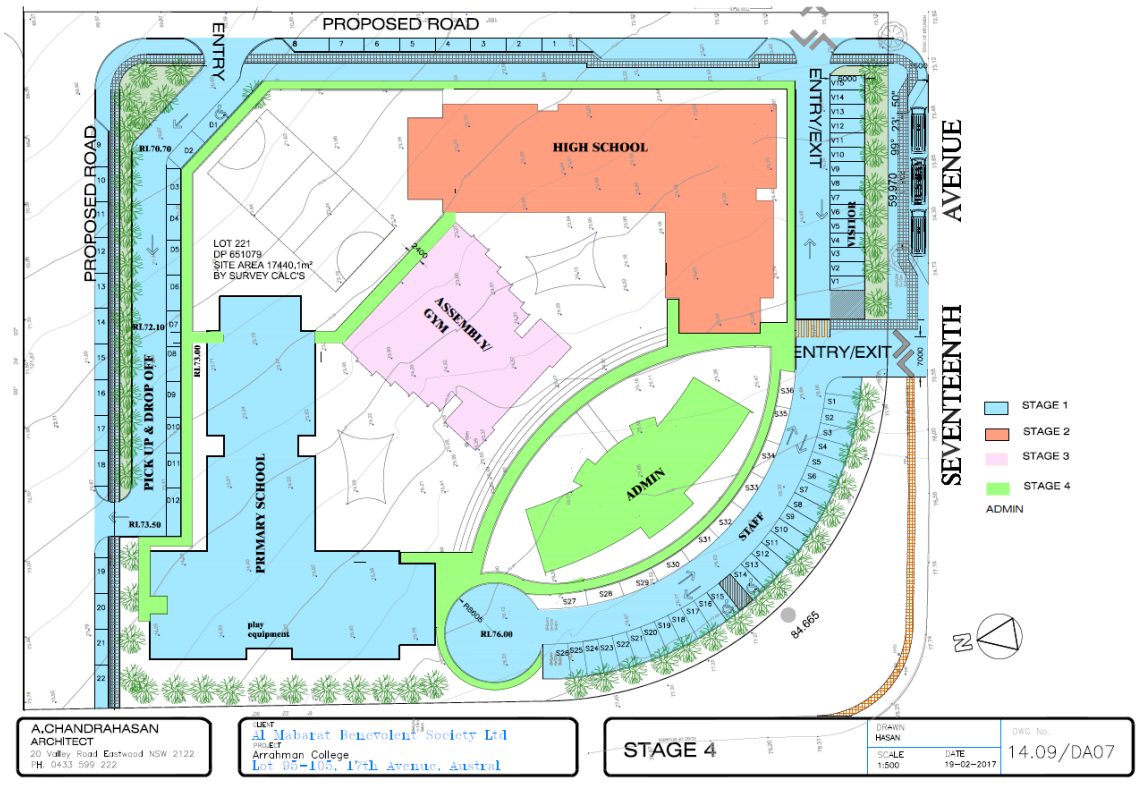


Figure 2-6 Proposed Stage 4 Plan



3 ASSESSMENT CRITERIA

A comprehensive acoustic assessment has been previously conducted for the proposed development by Rodney Stevens Acoustics Report No. R160222R0 dated 11 May 2016. The report contained the operational noise criteria for the school as:

Table 3-1 Project Specific INP Criteria

Assessment Period	ANL LAeq(Period)	Existing Noise Level - dBA		INP Criteria - dBA	
		RBL	LAeq(Period)	Intrusive LAeq(15min)	Amenity LAeq(Period)
Daytime	50	41	50	**46**	47

The limiting criterion for continuous operational noise emissions from the mechanical plant is **44 dBA**. Obtaining a noise criterion of "background + 10dB" for the assessment of children engaged in outdoor activities results in a project specific noise criteria of **51 dBA**.

However, in accordance with INP principles, where a noise source occurs over a limited duration throughout the day, adjustments are applied to the acceptable noise level at the receiver. These adjustments generally apply where a single-event noise is continuous for a period less than two and a half hours in any 24-hour period.

Applying such an adjustment to the assessment criterion for school carpark operation would not seem unreasonable given the operation of the source of noise is mainly concentrated over a one-hour period (at most) during the morning arrival and afternoon departure periods. Although it could be argued that this is not a single event noise (since it occurs over two separate periods throughout the day) the essentially (and expected) short duration nature of the activity does not warrant the application of an intrusiveness-based criterion.

In consultation with the INP procedures, a more reasonable criterion against which to compare and assess noise emissions associated with the proposed carpark is an additional 5 dBA increase in the acceptable noise level at the receptor, (ie L_{A90} + 10 dBA) or **51 dBA**.

4 NOISE MANAGEMENT PLAN

One of the most effective measures that should be implemented in conjunction with the physical noise controls is a Noise Management Plan (NMP). The NMP should be incorporated within the school's overall management plan:

- A separate daily program for both the warmer and cooler months should be established in order to regulate the total time spent outdoors and indoors.
- A contact phone number for the school office should be made available to neighbours to facilitate communication and to resolve any neighbourhood issues that may arise due to operation of the school;
- The number of classes outside at any one time should be limited to meet the noise criteria;
- The behaviour of children should be monitored and modified as required by supervising teachers during lunch and recess;

- Parents and guardians should be informed of the importance of noise minimisation when entering the site, dropping off or picking up children;

- Teachers should be educated to control the level of their voice while outside;

- Amplified music should be avoided to meet the noise criteria.

In previous developments of schools in NSW, Rodney Stevens Acoustics has adopted the following key aspects with regard to acoustic intrusion to nearby and adjoining residential dwellings:

- It is important to balance the operation of schools with community expectations. To achieve this outcome, many councils consider it necessary to seek appropriate acoustic privacy measures that are compatible with the prevailing character of residential areas. This is the preferred outcome rather than resorting to noise attenuation walls.

- There is also recognition that the good long term operation and management of schools can help to ensure development continues to harmoniously co-exist with the surrounding residential amenity.

- The location and design of school must consider the projection of noise from various activities to avoid any adverse impacts on the residential amenity of adjoining land.

- Schools traditionally form an essential part of all residential communities. Noise emissions from students engaged in active outdoor play are unlikely to achieve a "background + 5 dBA" or even a "background + 10 dBA" criterion at the site boundary. This is common across all educational facilities, particularly if the students are located near the boundary, and is often the case, in close proximity to residences.

In general, the impact of outdoor activity noise from schools is considered to be sufficiently mitigated by the site zoning and the limited periods of outdoor recreational activities, that is during PE classes, recess and lunch breaks, occurring between Monday to Friday during the relatively short school year and as such, does not warrant quantitative assessment.

Arrahman College proposes to have community uses, in particular with the lease of the School Auditorium and library. The leasing of the community uses may be used for the following:

1. Community Language classes outside of regular school times
   Proposed time: 4pm to 5.30pm weekdays and 9am to 12pm on Saturdays.
2. Community Scouts program to operate during all school holidays
   Proposed time: 9am to 5.30pm weekdays and 9am to 3pm on Saturdays.
3. Community Sport programs outside of regular school times
   Proposed time: 4pm to 5.30pm weekdays and 9am to 3pm on Saturdays
4. General Community Events – ***[School Auditorium only]*** (Birthdays, Cultural Celebrations, Religious Celebrations E.g. Baptisms etc.)
5. **Proposed time:** 7am to 10pm

Additionally, Religious and Cultural Uses are also proposed with the following times:

1. Annual Islamic 'Eid Carnivals
   Proposed time: 7am to 10pm (Weekdays and Weekends)
2. Ramadan Community Diners
   Proposed time: 5pm to 8pm (Weekdays and Weekends)
3. Cultural and Religious Community Lectures
   Proposed time: 5pm to 10pm (Weekdays and Weekends)

With the use of Community and Religious & Cultural purposes, the following noise control measures should be implemented within the school's NMP:

- Where Auditorium and Library is near full capacity, all external doors and windows should remain closed for the duration of the event

- The use of PA should be limited till 10pm

- In the event of Live Music or PA system use outside of the Auditorium and Library, consultation with an acoustic consultant should be sort for the placement of the speakers and volume control. Essentially the use of Subwoofers should be avoided

- During all large cultural events, management of carpark entry/exit from the site should be done in order for vehicles to enter/exit the carpark in a quiet manner

- During large cultural events, security should patrol all entrances/exits to ensure people are leaving in a quiet manner as not to make unreasonable noise

- Where the community members book the Auditorium or Library for events, management from the school should advise them of the noise restrictions.

5 CONCLUSION

Rodney Stevens Acoustics has conducted a Noise Management Plan for the Proposed School site at 95 - 105 Seventeenth Avenue, Austral NSW. Noise emissions from the school outdoor playground areas cannot readily be effectively controlled and the playground areas are only fully operational for a maximum for 1 hour per day. They also do not appear to constitute a serious threat to the acoustical amenity of the surrounding residential community and cannot be realistically defined as “offensive noise”.

Approved:-

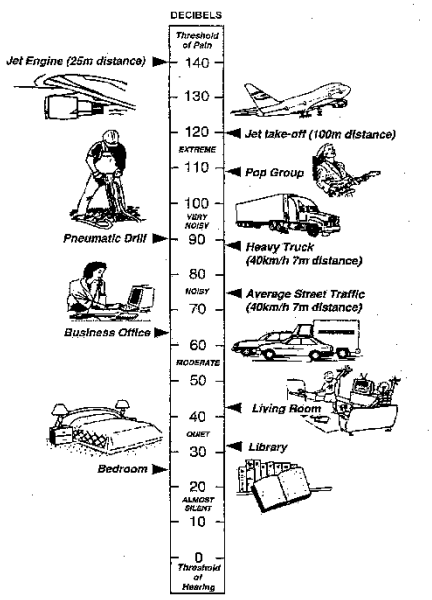
Rodney Stevens - MAAS

Appendix A – Acoustic Terminology

A-weighted sound pressure	The human ear is not equally sensitive to sound at different frequencies. People are more sensitive to sound in the range of 1 to 4 kHz (1000 – 4000 vibrations per second) and less sensitive to lower and higher frequency sound. During noise measurement an electronic '*A-weighting*' frequency filter is applied to the measured sound level *dB(A)* to account for these sensitivities. Other frequency weightings (B, C and D) are less commonly used. Sound measured without a filter is denoted as linear weighted dB(linear).
Ambient noise	The total noise in a given situation, inclusive of all noise source contributions in the near and far field.
Community annoyance	Includes noise annoyance due to: ▪ character of the noise (e.g. sound pressure level, tonality, impulsiveness, low-frequency content) ▪ character of the environment (e.g. very quiet suburban, suburban, urban, near industry) ▪ miscellaneous circumstances (e.g. noise avoidance possibilities, cognitive noise, unpleasant associations) ▪ human activity being interrupted (e.g. sleep, communicating, reading, working, listening to radio/TV, recreation).
Compliance	The process of checking that source noise levels meet with the noise limits in a statutory context.
Cumulative noise level	The total level of noise from all sources.
Extraneous noise	Noise resulting from activities that are not typical to the area. Atypical activities may include construction, and traffic generated by holiday periods and by special events such as concerts or sporting events. Normal daily traffic is not considered to be extraneous.
Feasible and reasonable measures	Feasibility relates to engineering considerations and what is practical to build; reasonableness relates to the application of judgement in arriving at a decision, taking into account the following factors: ▪ Noise mitigation benefits (amount of noise reduction provided, number of people protected). ▪ Cost of mitigation (cost of mitigation versus benefit provided). ▪ Community views (aesthetic impacts and community wishes).

- Noise levels for affected land uses (existing and future levels, and changes in noise levels).

Impulsiveness	Impulsive noise is noise with a high peak of short duration or a sequence of these peaks. Impulsive noise is also considered annoying.
Low frequency	Noise containing major components in the low-frequency range (20 to 250 Hz) of the frequency spectrum.
Noise criteria	The general set of non-mandatory noise levels for protecting against intrusive noise (for example, background noise plus 5 dB) and loss of amenity (e.g. noise levels for various land use).
Noise level (goal)	A noise level that should be adopted for planning purposes as the highest acceptable noise level for the specific area, land use and time of day.
Noise limits	Enforceable noise levels that appear in conditions on consents and licences. The noise limits are based on achievable noise levels, which the proponent has predicted can be met during the environmental assessment. Exceedance of the noise limits can result in the requirement for either the development of noise management plans or legal action.
Performance-based goals	Goals specified in terms of the outcomes/performance to be achieved, but not in terms of the means of achieving them.
Rating Background Level (RBL)	The rating background level is the overall single figure background level representing each day, evening and night time period. The rating background level is the 10^{th} percentile min L_{A90} noise level measured over all day, evening and night time monitoring periods.
Receptor	The noise-sensitive land use at which noise from a development can be heard.
Sleep disturbance	Awakenings and disturbance of sleep stages.
Sound and decibels (dB)	Sound (or noise) is caused by minute changes in atmospheric pressure that are detected by the human ear. The ratio between the quietest noise audible and that which should cause permanent hearing damage is a million times the change in sound pressure. To simplify this range the sound pressures are logarithmically converted to decibels from a reference level of 2 x 10-5 Pa. The picture below indicates typical noise levels from common noise sources.



dB is the abbreviation for decibel – a unit of sound measurement. It is equivalent to 10 times the logarithm (to base 10) of the ratio of a given sound pressure to a reference pressure.

Sound Power Level (SWL)

The sound power level of a noise source is the sound energy emitted by the source. Notated as SWL, sound power levels are typically presented in *dB(A)*.

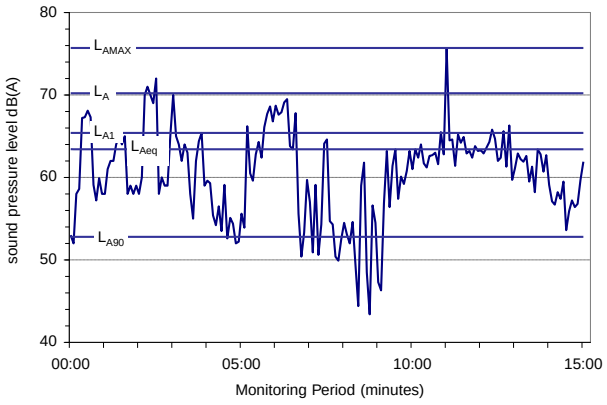
Sound Pressure Level (SPL)

The level of noise, usually expressed as SPL in *dB(A)*, as measured by a standard sound level meter with a pressure microphone. The sound pressure level in *dB(A)* gives a close indication of the subjective loudness of the noise.

Statistical noise levels

Noise levels varying over time (e.g. community noise, traffic noise, construction noise) are described in terms of the statistical exceedance level.

A hypothetical example of A weighted noise levels over a 15 minute measurement period is indicated in the following figure:



Key descriptor

- LAmax Maximum recorded noise level.

- LA1 The noise level exceeded for 1% of the 15 minute interval.
- LA10 Noise level present for 10% of the 15 minute interval. Commonly referred to the average maximum noise level.
- LAeq Equivalent continuous (energy average) A-weighted sound pressure level. It is defined as the steady sound level that contains the same amount of acoustic energy as the corresponding time-varying sound.
- LA90 Noise level exceeded for 90% of time (background level). The average minimum background sound level (in the absence of the source under consideration).

Threshold	The lowest sound pressure level that produces a detectable response (in an instrument/person).
Tonality	Tonal noise contains one or more prominent tones (and characterised by a distinct frequency components) and is considered more annoying. A 2 to 5 dBA penalty is typically applied to noise sources with tonal characteristics.

Appendix B – Calibration Certificates

Acoustic Research Labs Pty Ltd
Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
IEC 61672-3.2006

Calibration Certificate

Calibration Number C15557

Client Details	Rodney Stevens Acoustics Pty Ltd 1 Majura Close St Ives Chase NSW 2075
Equipment Tested/ Model Number :	Rion NL-42
Instrument Serial Number :	00810779
Microphone Serial Number :	148338
Pre-amplifier Serial Number :	22257

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	20.8°C	**Ambient Temperature :**	20.7°C
Relative Humidity :	51.4%	**Relative Humidity :**	51.4%
Barometric Pressure :	99.85kPa	**Barometric Pressure :**	99.81kPa

Calibration Technician :	Dennis Kim	**Secondary Check:**	Kate Alchin
Calibration Date :	20/10/2015	**Report Issue Date :**	20/10/2015

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10: Self-generated noise	*Pass*	14: Level linearity on the reference level range	*Pass*
11: Acoustical tests of a frequency weighting	*Pass*	15: Level linearity incl. the level range control	*Pass*
12: Electrical tests of frequency weightings	*Pass*	16: Toneburst response	*Pass*
13: Frequency and time weightings at 1 kHz	*Pass*	17: Peak C sound level	*Pass*
		18: Overload Indication	*Pass*

The sound level meter submitted for testing has successfully completed the class 2 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2002 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002 and because the periodic tests of IEC 61672-3:2006 cover only a limited subset of the specifications in IEC 61672-1:2002.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.120dB*	*Temperature*	*±0.3°C*
12.5kHz	*±0.165dB*	*Relative Humidity*	*±4.1%*
16kHz	*±0.245dB*	*Barometric Pressure*	*±0.1kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.121dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA
WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/National standards.

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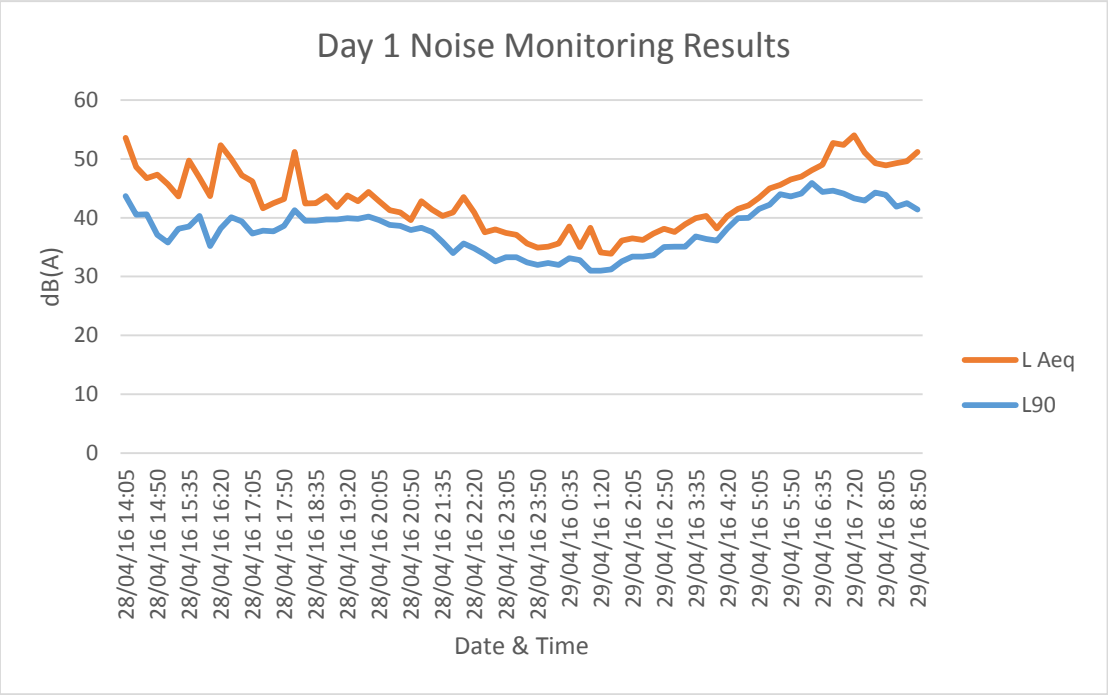
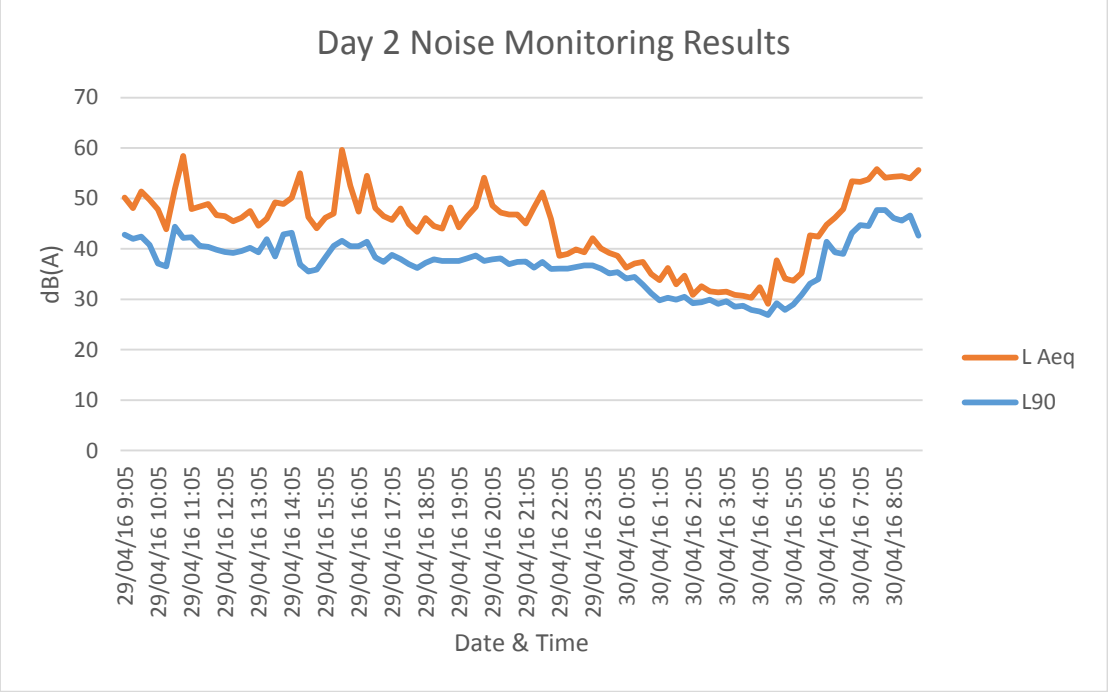
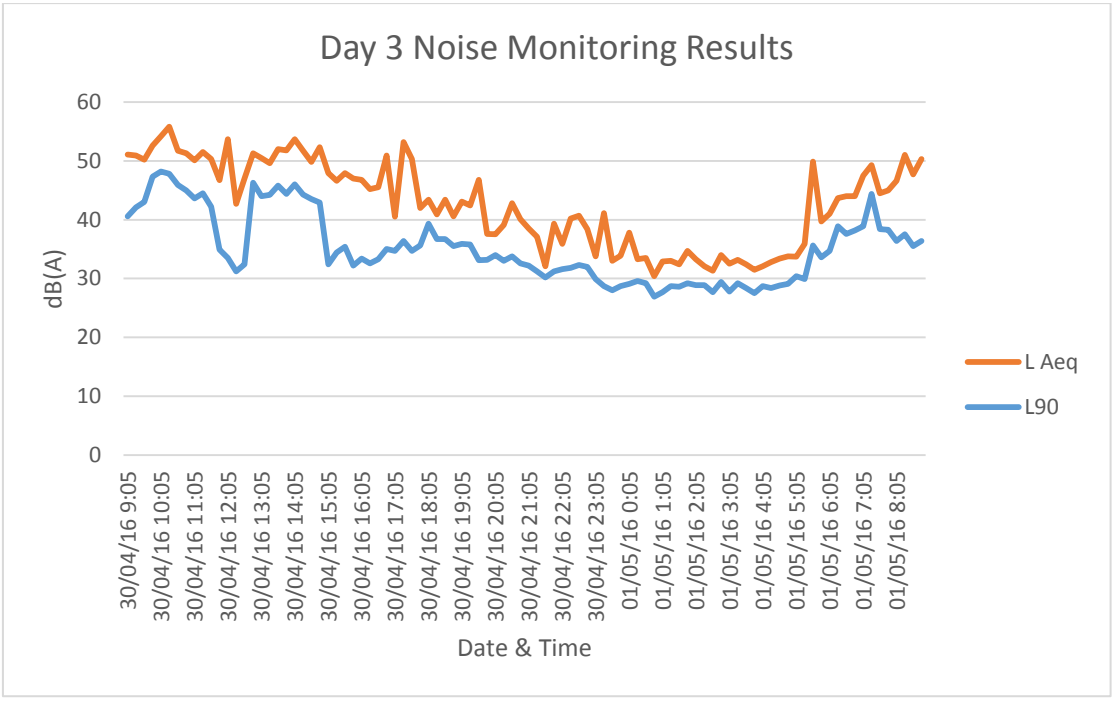
Appendix C – Unattended Noise Monitoring Results



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40
30
20
10
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30/04/16 13:05
30/04/16 14:05
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30/04/16 16:05
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01/05/16 4:05
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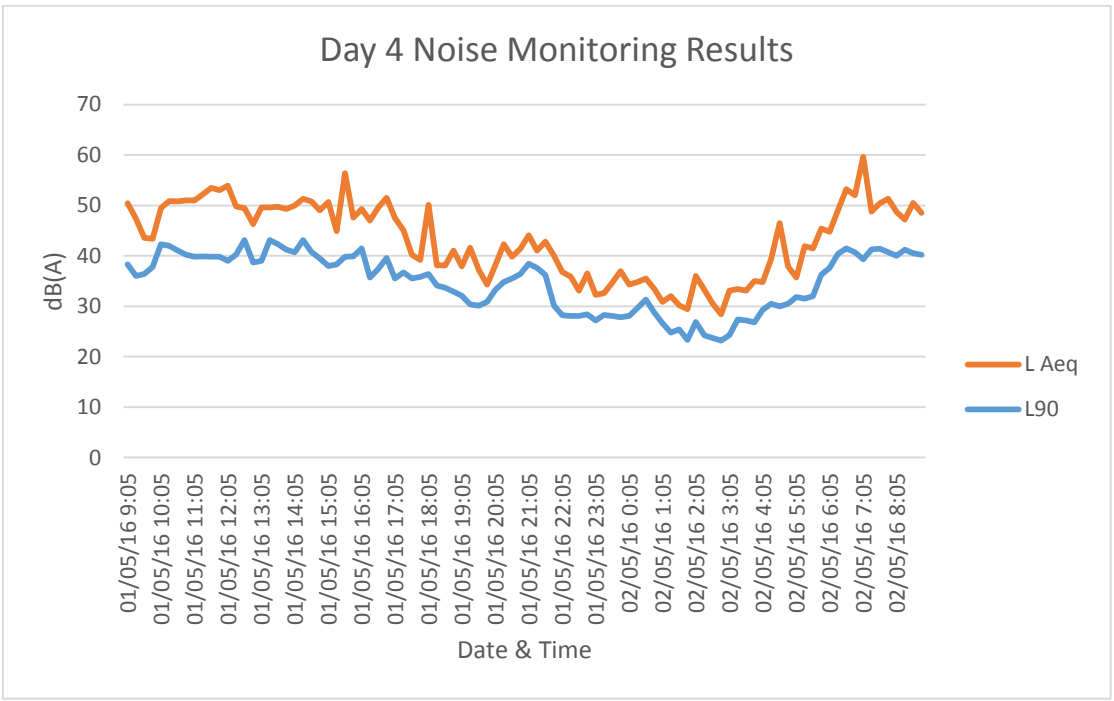
01/05/16 6:05
01/05/16 7:05
01/05/16 8:05
Date & Time
L Aeq
L90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50
40
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20
10
0
dB(A)
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01/05/16 10:05
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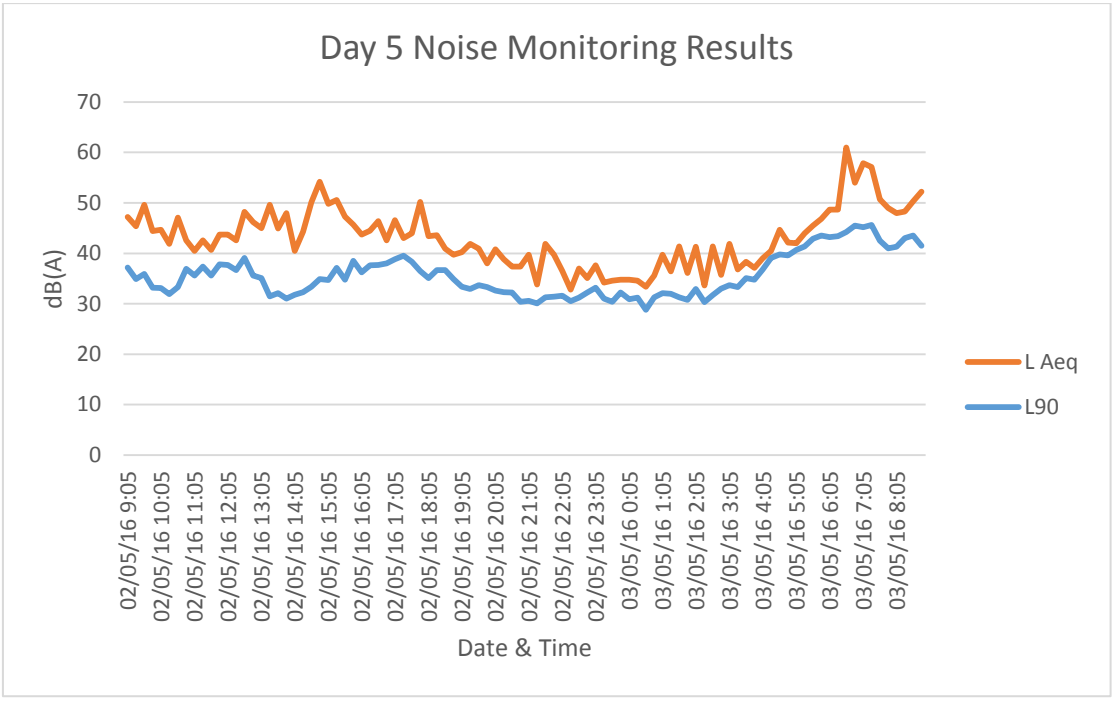
Date & Time
L Aeq
L90


Day 5 Noise Monitoring Results
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60
50
40
30
20
10
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dB(A)
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Date & Time
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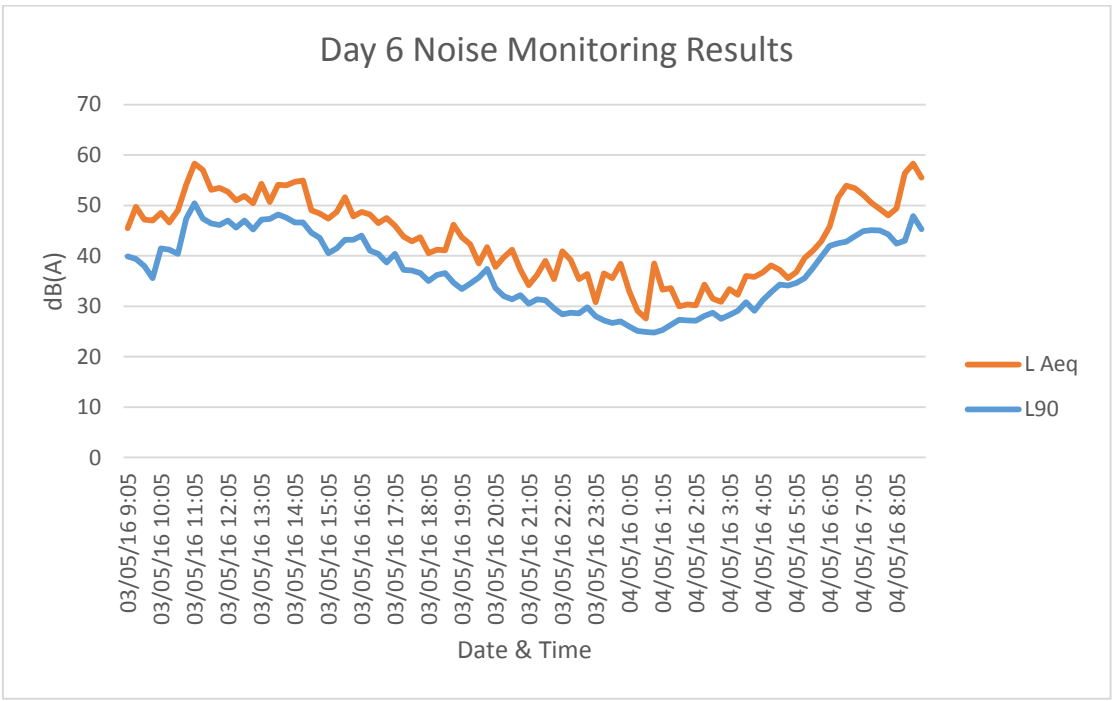
L90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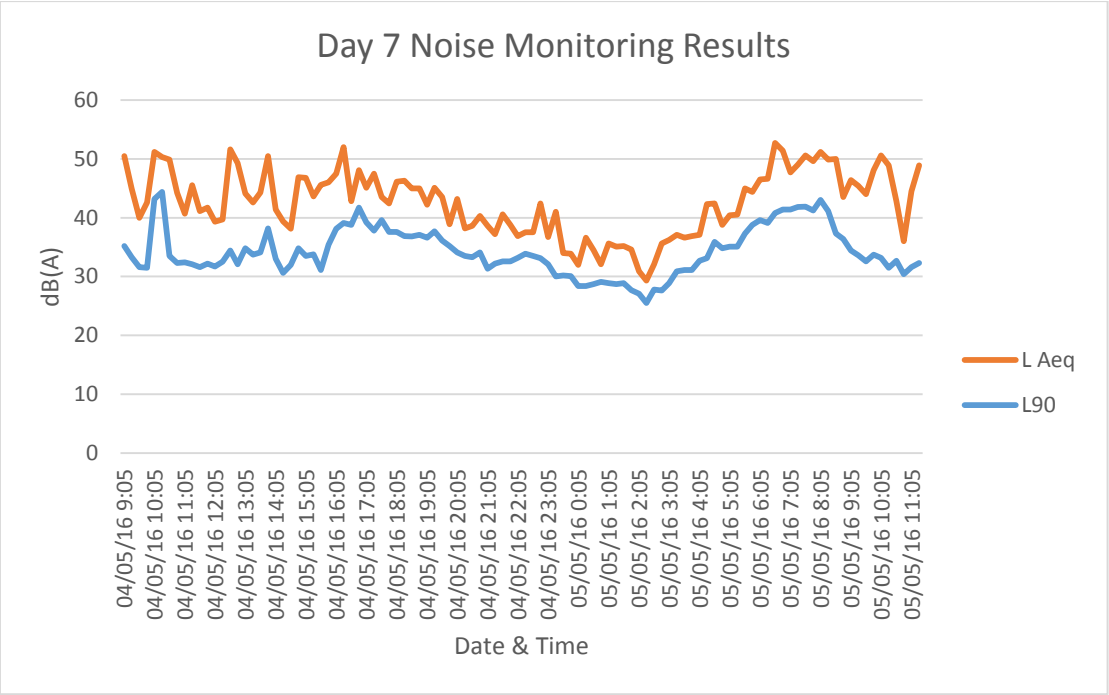
Date & Time
L Aeq
L90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50
40
30
20
10
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dB(A)
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