MANAGING DIRECTORS
MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS
MATTHEW SHIELDS
BEN WHITE

Artur Phillip High School, Parramatta

Extended Hours Construction Noise Impact 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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EXECUTIVE SUMMARY

A construction noise assessment has been carried out for the proposed extension of construction hours associated with the internal works within the Artur Phillip High School, Parramatta being constructed by Watpac. The potential impacts from these activities have been assessed based on the requirements of the local council, the EPA and the relevant Australian Standards. The results of the assessment have been used to develop controls that will be used to manage impacts from these activities.

The report identifies any potential noise impacts from internal fit out construction activities proposed by Watpac. The objective of this study is to investigate if internal construction works may be undertaken during the after-hours period without having a negative acoustic impact and to protect the amenity of the sensitive receivers surrounding the site.

Acoustic Logic Consultancy (ALC) have concluded from this assessment that based on the construction activities proposed, construction noise emissions during the proposed hours until midnight on any given day can comply with the construction noise emission requirements of the EPA and the Australian Standard AS2436.

1 INTRODUCTION

This report presents the assessment of noise impacts associated with the proposed extended hours of construction works to be carried out as part of the internal works of the Artur Phillip High School, Parramatta .

This report addresses noise impacts associated with internal works during the evening and night time periods and the formulation of acoustic treatments to ensure that noise emissions comply with the Council of the City of EPA's Interim Construction Noise Guideline.

The proposed construction hours associated with this assessment involve an extension from the approved construction period until midnight, 7 days a week for internal works associated with project only, once the buildings external faced is completed.

Acoustic Logic Consultancy (ALC) confirms that noise impacts during the extended construction hours period can comply with the relevant EPA construction noise criteria and will not result in an additional noise impact above the ambient acoustic environment.

2 SITE DESCRIPTION

The proposed works are to be conducted within the Artur Phillip High School, Parramatta project including the Artur Phillip High School and Parramatta Public School projects located at 171 - 177 Macquarie Street, Parramatta.

2.1 SENSITIVE RECEIVERS

The site is adjoined to the north, south and east by commercial development. Arthur Phillip High School is directly to the north and west of the site.

The nearest residential receivers are east of the site on Charles Street.

We note that there is a heritage building located adjacent to the proposed construction on the western end of the Arthur Phillip Public School site.

See aerial photo, below.

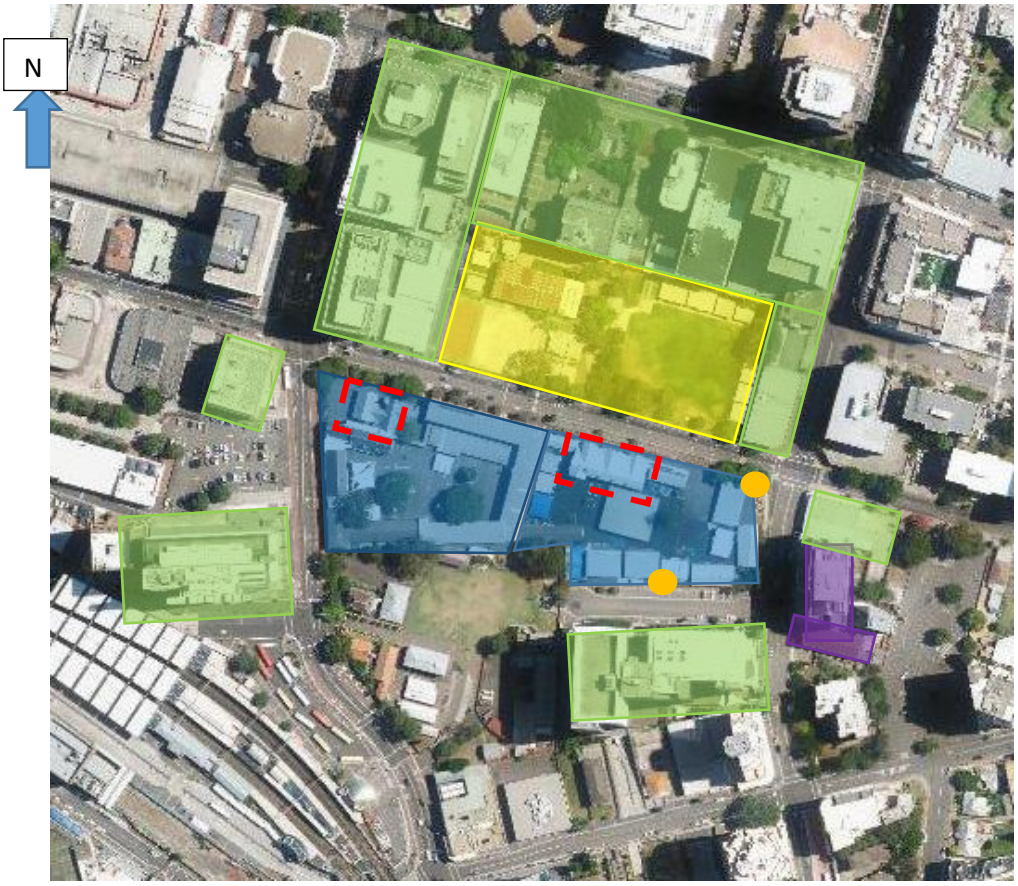


Figure 2-1 Site Plan showing region of works

Arthur Phillip High School

Parramatta Public School site

Residential Receivers (Charles Street)

Commercial Receivers

Locations of unattended noise monitoring conducted by ARUP

Location of Heritage Buildings

3 PROPOSED WORKS TO BE CARRIED OUT

This study includes works associated with the internal works of the project only, once the buildings external façade is completed. No external construction works are proposed as part of the extended hours application.

3.1 CURRENT WORKING HOURS

The current working for the site include those detailed in Item C1, of the Conditions of Consent and include the following:

- Monday to Friday: 7am – 6pm.
- Saturday: 7:30am – 3:30pm.
- Sunday or Public Holidays: No work.

3.2 EXTENSION OF CONSTRUCTION HOURS PROPOSAL

It is proposed to extend these construction hours to include:

1. Up until midnight, 7 days a week for internal works only.

Construction works during this period will be limited to internal works within the development, once the buildings external façade is completed and can be closed and includes the operation of the projects external hoists.

3.3 INTERNAL WORKS

The construction activities which will be assessed in this document are internal works, fitout and finishes works to the projects including the Artur Phillip High School and Parramatta Public School projects. Specific works are as described below.

3.3.1 Internal Works, Fitout and Finishes Works

This involves all internal work including fitout work from the installation of plasterboard ceilings, partitions, services installation, painting and joinery. All work covered under this section, will be contained within the building, with the completed facade providing a barrier to the direct transmission of noise to the exterior environment.

Internal fitout and finishes works are typically to be limited to:

- Installation of partitions;
- Fixing, setting & sanding of plasterboard;
- Painting;
- Laying of floor finishes;
- Installation of furniture;
- General fit-off; power points, light fittings, installation of taps, shower screens etc;
- Cleaning; and
- Testing and commissioning of internal plant.

The proposed works associated with the fit out of the residential development are described below.

Table 1 – Proposed Internal Construction Works

Activity	Task Description	Noise Sources
Fitout	Interior fitout including construction of ceilings, partition walls, surface finishes and services	Power tools (typically drills for plasterboard fixing and furniture), hand tools

3.3.2 Deliveries

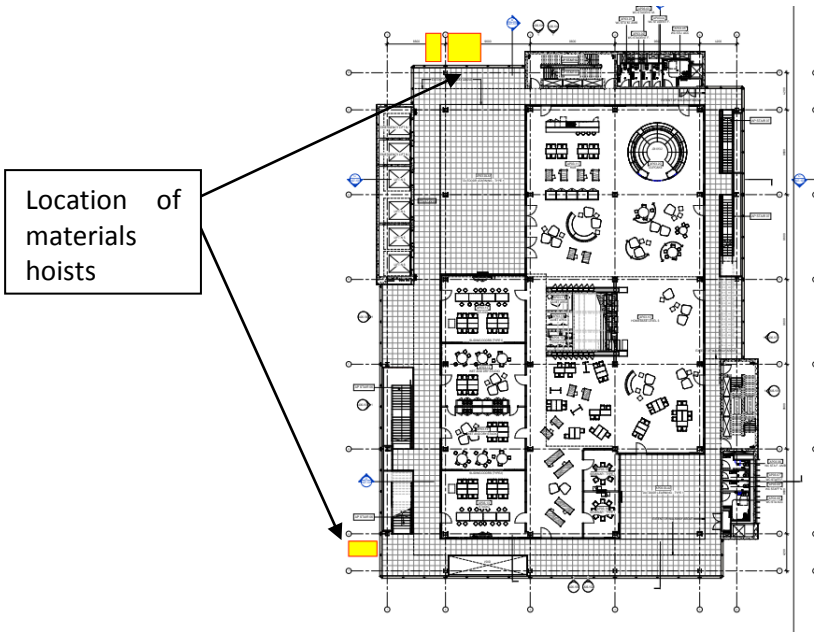
Deliveries are proposed to be undertaken within the currently approved DA Conditions of Consent.

3.3.3 Site Access

Access to the site will be provided by the exiting construction management plan and will not be changed based on the proposed extension of working hours for internal works.

3.3.4 Hoists

The proposed extended hours period includes the operation of the external hoists. The hoists are to be located to the external sides of the building, detailed in the figure below, which is located in position which faces away from residential receivers within proximity to the site.



3.4 CONSTRUCTION NOISE LEVELS

Noise impact will be determined from all processes and equipment, which are involved in the activities outlined above by defining the levels of sound, which they generate.

The A-weighted sound power levels for general component parts of the above-described activities are outlined in the tables below.

Table 2 – Construction Activities – Sound Power Levels

Construction Activity	Equipment / Process	Noise Level – dB(A)
Fitout	Hammering	110 SWL
	Drilling	94 SWL
	Impact drill	112 SWL
	Electric Saw	94 SWL
	Angle Grinders	114 SWL
Materials Hoist	Hoist operations	105 SWL

The noise levels presented in the above table are derived from the following sources, namely:

1. On-site measurements
2. Table D2 of Australian Standard 2436-1981
3. Data held by this office from other similar studies.

Noise monitoring previously conducted by ALC on internal fit out works will be used for the basis of this assessment. Noise monitoring was conducted over a two week period for the internal demolition and fitout works at similar projects.

The worst case 15 minute measurement period from the two weeks of demolition and fitout works indicated a sound pressure level of 97dB(A) L_{10} within the enclosed reverberant space. The internal works were conducted in as similar sized space to that associated with a bare shell apartment.

This internal noise level will be used as a basis for the assessment of internal construction noise during the proposed extended hours period.

3.5 CONSTRUCTION METHODOLOGY

Fitout works will be conducted using the following strategy:

1. Contractors constructing partitions, lining, joinery and the like. These teams will be using power and hand tools and the like and will generate noise internally within the buildings of the Artur Phillip High School, Parramatta project (noise levels as detailed above).

2. All equipment and materials will be stored internally before works being on site in the evening.

3. Typically noise will be associated with painting, electrical wiring, flooring and installation of electrical and lighting fittings which are significantly quieter than that used for this assessment which is based on angle grinding and/or circular saw.

4 CONSTRUCTION NOISE OBJECTIVES

The assessment of noise and vibration impact associated with the proposed internal works within the Artur Phillip High School, Parramatta development during the proposed extended hour's period will be conducted in compliance with the requirements of the EPA's Interim Construction Noise Guideline and the Australian Standard AS2436- Guide to Noise Control on Construction Maintenance and Demolition Site.

4.1.1 EPA –Construction Noise Guideline

The Interim Construction Noise Guideline outlines that the transmission of noise generated by various construction/demolition activities will primarily occur via two paths:

- Airborne Noise
- Ground-borne Noise

4.1.1.1 Airborne Noise Transmission Criteria for Residential Receivers

Table 2 of the Interim Construction Noise Guideline outlines the management levels for noise at residences depending on the hours of construction. The management levels are outlined in the table below.

Table 3 – Noise Management Levels for Residential Receivers

Time of Day	Management Level dB(A)$L_{eq(15mins)}$
Recommended standard hours: Monday to Friday(7am – 6pm); Saturdays (8am – 1am) and no works on Sunday or public holidays	Noise affected RBL* + 10dB
Outside recommended standard hours	Noise affected RBL* + 5dB

Table 4 – ICGN Recommended Construction Noise Management Levels

Receiver	Management Level	External Sound Level, $L_{eq\ 15\ min}$ dB(A)	Where Applied
Residential	Noise Affected Level [1]	Background + 10dB(A)	Externally – Normal Working hours
	Highly Noise Affected Level [2]	75dB(A)	Externally – Normal Working hours
	Noise Affected Level [1]	Noise affected RBL* + 5dB	Externally - Outside recommended standard hours
Commercial Office	Noise Affected Level	70dB(A)	Externally (When in use)

1: Where the predicted or measured L_{Aeq} (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise.

2: Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.

4.2 BACKGROUND NOISE MONITORING

Background noise levels have been determined from monitoring on site.

Long term unattended and attended background noise measurements were undertaken by ARUP at project approval stage and are presented in the table below.

Table 5 – Measured Background Noise Levels, dB(A) L_{90}

LOCATION	PERIOD/TIME	BACKGROUND NOISE LEVEL dB(A)L_{90}
Corner of Charles Street and Macquarie Street*	Day (7am to 6pm)	57
	Evening (6pm to 10pm)	50
	Night (10pm to 7am)	46
Little Street	Day (7am to 6pm)	52
	Evening (6pm to 10pm)	48
	Night (10pm to 7am)	46

*This monitoring location is nearest to the residential receivers on Charles Street.

4.3 ADDITIONAL ATTENDED NOISE LEVEL MEASUREMENTS

In addition to the noise monitoring previously undertaken at the site Acoustic Logic Consultancy has undertaken attended background noise level measurement at the site during the night time period of 12midnight to 1am on the 15th February 2018 to assess existing background noise levels.

Attended background noise level measurements were undertaken using a Norsonics type SA110 Sound Analyser was used for the noise measurements. 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 results of the background noise levels are presented in the below.

Table 6 – Measured Background Noise levels

Location	Time Period	Background Noise Level db(A) $L_{90\ (15min)}$
Worst affected residential receiver	Nightime	47

4.4 CONSTRUCTION NOISE OBJECTIVES

The resulting noise levels criteria for construction noise during the proposed extended hours period is detailed in the table below based on the logging background noise level of 53 dB(A) L_{90}.

Table 7 – Resulting Extended Hours Period Noise Criteria

Time of Day	Level dB(A)$L_{eq(15mins)}$
Extended hours period evening (Background noise + 5 dB(A))	53
Extended hours period night (Background noise + 5 dB(A))	51

5 CONSTRUCTION NOISE MODELLING

Construction noise emissions associated with internal activities have been predicted using the noise modeling.

5.1 NOISE PREDICTIONS

Noise level assessment was conducted to investigate the potential for noise impact from internal fit out works during the extended hour's period of the surrounding receivers to the Artur Phillip High School and Parramatta Public School, Parramatta projects.

It is noted that all the receivers within the proximity of the project are commercial receivers and would not generally be in operation during the proposed extended hours period, however the assessment of potential noise impacts has been undertaken.

There is a residential receiver to the west of the site which has also been assessed in this report.

Input information which has been used in the development of the model included the following:

1. The loudest typical works were being conducted simultaneously on a particular floor level (3 consecutive levels) within the project, This assumes that:
    - The building is split into eight components around the core and there are no partition walls between each unit. This means that a uniform sound pressure level will be being emitted from each window on each façade, which will provide the most conservative assessment.
    - The internal sound pressure level of 97dB(A) $L_{10\ 15min}$ has been adopted for general internal construction works. The sound pressure level assumes it is emanating out of each apartment window.
    - The general works will be attributed to partition sheeting, finishes and floor installation which will not be typically loud works and will be significantly less than that assumed generally.
2. The transmission loss of the residential façade used was R_w 30 for the installed faced of the projects. It should be noted that in all circumstances glazing is equal to or exceeds this rating

Internal fit out of the Building with the external façade completed.

Internal noise levels during the fi tout have been based on the worst case internal noise level from the loudest piece of plant.

- The worst case internal sound pressure level of 97dB(A) based on monitoring previously conducted by ALC within each building component as detailed above;

- The building façade is closed and constructed as per the project acoustic requirements for external noise intrusion into the building. This constitutes a minimum glazing specification of Rw 30.

5.2 PREDICTED NOISE LEVELS

Noise emissions from internal construction activities have been predicted. Predicted noise levels are presented at the nearest potentially affected residential receivers.

Table 8 – Predicted Construction Noise Levels *(Category 4)*

Activity	Receiver Location	Timer period	Predicted Noise Level dB(A) L_{eq} 15min	Construction Noise Criteria dB(A) $L_{av\ max}$ 15min	Complies
Internal Fit out	Commercial receivers	Evening	41	53	Yes
		Night	41	51	Yes
	Residential receivers	Evening	37	53	Yes
		Night	37	51	Yes
Materials hoist	Residential receivers	Evening	45	53	Yes
		Night	45	51	Yes

6 SAMPLE NOISE CALCULATIONS

In addition to the noise modelling detailed in the section above a number of sample calculations have been presented in this section of the report.

Sample calculations of the potentially worst case noise level sources associated with the fit out works and resulting noise levels at receivers are detailed below:

The following is a sample calculation used to predict the noise level at the worst affected residence; that being the residences to the west of the site from the operation of the internal works.

1.	Noise source (Fit out Sound Pressure Level):	97 dB(A) SPL
2.	Area correction (floor of facades being worked behind)	+4 dB
3.	Number of floors (x 3)	+5 dB

Note: Area and number of windows approximates the amount of glazing on one floor directly facing the receiver.

4.	Façade noise reduction TL:	-31 dB
5.	Distance Correction (20m):	-34 dB
6.	Resultant Noise level at receiver façade:	41 dB(A)

7 RECOMMENDED MANAGEMENT CONTROLS

The following management controls are recommended to ensure that noise emanating from the site during construction works comply with the noise emission criteria.

- The façade is to be entirely closed during extended construction hours works.
- No external construction works are to be conducted during the extended construction hours period.
- Deliveries are to be undertaken during normal construction hours.

8 DISCUSSION

Noise associated with internal fit out works during extended construction hours for the Artur Phillip High School, Parramatta have been found to comply with the EPA's Interim Construction Noise Policy based on the worst case scenario of an internal sound pressure level of 97dB(A) as discussed in Section 5.1.

It should be noted that the assessment scenario is unlikely to occur in practice as it is unlikely that all sections of the floor plate would be worked on simultaneously with the loudest items of plant as is assumed in our predictions. In practice, Acoustic Logic Consultancy would expect that the majority of fit out works would typically produce noise levels significantly lower than that predicted.

On this basis, internal fit out works will comply with the EPA's Interim Construction Noise Policy noise emission criteria on the proviso that all works are conducted behind a closed façade.

9 CONCLUSION

This report presents the assessment of construction noise impacts associated with the proposed extension of construction hours for internal works within the Artur Phillip High School, Parramatta projects.

Predicted noise levels from the worst case internal construction works in conjunction with external fit out constructions indicate that noise emissions will comply with the EPA's Interim Construction Noise Guideline and will therefore be acoustically acceptable.

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

Yours faithfully,

Acoustic Logic Consultancy Pty Ltd
Ben White