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Mar Narsai College, Horsley Park

Acoustical Assessment

Report Number 610.12346-R1

30 January 2013

Platinum.Biz Pty Ltd
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Mar Narsai College, Horsley Park

Acoustical Assessment

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Table of Contents

Table of Contents

TABLES

FIGURES

1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by Platinum.Biz Pty Ltd on behalf of The Assyrian School Limited to conduct an acoustical assessment of the proposed development of a new high school at Horsley Park to accompany a Development Application to Fairfield City Council.

This assessment examines noise emissions potentially generated by the proposed development, including noise from road traffic and noise egress from the materials facility (workshops), music rooms, the COLA, GLAs and outdoor recreation areas. In accordance with Council's requirement, the Environment Protection Authority's (EPA's) Industrial Noise Policy (INP, 2000) has been used as the basis for the assessment of day-time noise emissions. The high school's operations will not extend into the night-time period so any night-time criterion is not applicable to the assessment.

An assessment of the impact of aircraft noise from the proposed Badgerys Creek Airport has also been undertaken.

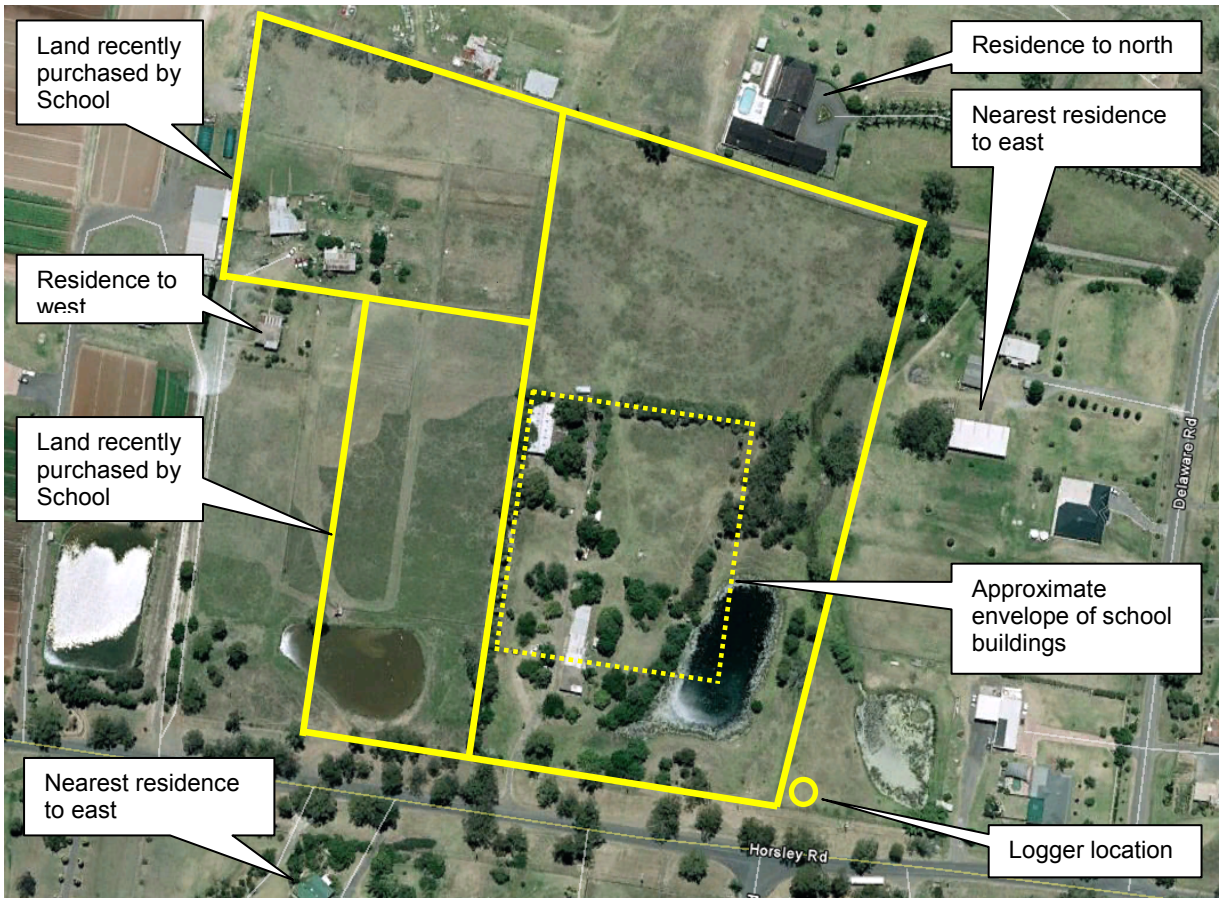
The acoustical assessment has been based upon architectural drawings prepared by PMDL Architecture & Design Pty Ltd and information provided by Platinum.Biz Pty Ltd.

2 PROPOSED DEVELOPMENT

2.1 Site Location

The proposed high school is to be located on Horsley Road, west of the Delaware Road intersection (refer **Figure 1**). The surrounding properties are rural residential. The nearest residence potentially affected by the proposed development is located approximately 120 metres from the western site boundary. A residence is located approximately 25 metres from the northern boundary. To the east, the nearest residence appears to be approximately 120 metres from the proposed high school boundary and the nearest residence to the south is approximately 100 metres from the proposed high school location.

Figure 1 Site Location



Aerial image courtesy Google Earth

2.2 Development Description

The proposed development comprises a new high school capable of accommodating 600 students from years 5 -12 and 52 staff.

The development consists of:

- Classrooms (GLAs)
- Practical activity rooms including music and industrial arts
- Administration offices
- Library
- Canteen
- Amenities
- Outdoor play areas

The proposed development will be available for operation between 7.00 am to 5.00 pm Monday to Friday and from 8.00 am to midday on Saturday and Sunday.

The proposed site layout is shown in **Figure 2**.

Figure 2 Site Plan

Image courtesy pmdl Architecture Pty Ltd.

3 EXISTING NOISE ENVIRONMENT

3.1 General

In order to characterise the existing acoustical environment in the area of the proposed new high school, a survey of environmental noise levels was conducted from Monday 9 October 2006 to Monday 16 October 2006. Measurements were made at the south western corner of the property located at 1-9 Delaware Road (ie, on the Horsley Road boundary - **Figure 1** refers).

Given the development of the surrounding area since this time, increases in the ambient noise environment are likely, primarily resulting from increasing road traffic volumes on the local, sub-arterial and arterial road network. However, for the purposes of establishing compliance with the DA conditions, this acoustical assessment is based upon the background (L_{A90}) noise levels measured during this 2006 survey – as these measured levels will result in lower (quieter) noise criteria.

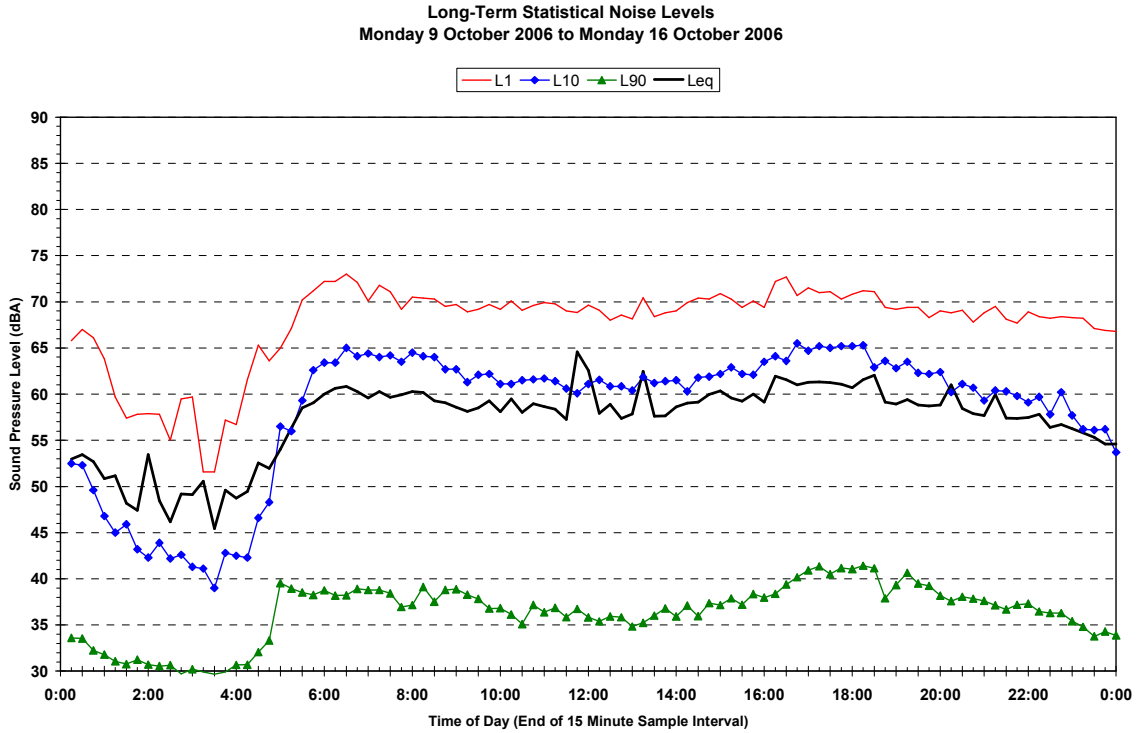
3.2 Ambient Noise Levels

3.2.1 Long-term (Unattended) Noise Logging

An ARL Environmental Noise Logger Type EL-215 (Serial Number 194630) was programmed to monitor continuously with a sample interval time of 15 minutes. The logger was calibrated prior to and immediately following measurements. The drift in calibration did not exceed ± 0.5 dBA.

The results of the ambient noise survey are shown in the long-term data chart (**Figure 3**).

Figure 3 Long-term Ambient Noise Levels



The descriptors shown on the graph are:

- L_{Aeq} The L_{Aeq} is the energy-average sound level. It is the steady sound level that, over the specified period of time, has the same energy as the fluctuating sound level that occurs over that period.
- L_{A1} The noise level exceeded for 1% of the sample time (15 minutes) and representative of the highest noise level events (eg passing heavy vehicles, aircraft, etc).
- L_{A10} The noise level exceeded for 10% of the sample time (15 minutes) and is often described as “the average maximum noise level”.
- L_{A90} The L_{A90} is the level of noise exceeded for 90% of the sample time (15 minutes). The L_{A90} noise level is often described as “the average minimum background noise” level or simply “the background level”.

The data obtained during the survey is representative of the ambient noise environment experienced by surrounding rural residential receivers. The data was processed in accordance with the procedures contained in the INP to determine the representative noise levels at the site. The results of this analysis are presented in **Table 1**.

Table 1 Measured Ambient Noise Levels Corresponding to Defined INP Periods

Location	Measurement Descriptor	Measured Noise Level - dBA re 20 µPa		
		Daytime 7.00 am - 6.00 pm	Evening 6.00 pm - 10.00 pm	Night-time 10.00 pm - 7.00 am
Horsley Road	L_{Aeq} [1]	59	59	56
	RBL (Background) [2]	37	43	32

Note 1: The LAeq is a kind of "average sound level". It is defined as the steady sound level that contains the same amount of acoustical energy as a given time-varying sound.

Note 2: Rating Background Noise Level (RBL) is a single statistical noise descriptor describing the LA90 background noise level of the relevant assessment period. In accordance with the INP, the Rating Background Level (RBL) for each assessment period is obtained by calculating the median values of the relevant day/evening/night Assessment Background Levels (ABLs), for each day of the survey. For example, for a week's worth of monitoring, the night-time RBL is the median of the seven night-time ABLs.

The ABL is the single figure background noise level representing each assessment period (day, evening and night). The ABL noise level is determined by calculating the lower 10 percentile level of all LA90(15minute) samples for each assessment period.

3.2.2 Operator-attended Noise Measurements

Operator-attended noise measurements were also conducted on 22 September 2006 using a calibrated Brüel & Kjær 2260 Precision Sound Level Meter. These measurements were undertaken to determine the predominant sources contributing to the noise environment at the site.

The results obtained have been scaled to correspond with the overall daytime L_{A90} and night-time L_{A90} levels obtained from the unattended noise monitoring and are shown in **Table 2**.

Table 2 Typical Background (L_{A90}) Noise Spectra at Proposed High School Site

Location	Time Period	Octave Band Centre Frequency Hz								Overall Level LAeq dBA re 20 µPa
		63	125	250	500	1k	2k	4k	8k	
High School Site	Day	48	42	33	34	30	29	27	16	37
	Night	43	37	28	29	25	24	22	11	32

3.3 Road Traffic Noise

The noise data obtained during the survey was also processed to determine the representative road traffic noise levels at the site. The results of this analysis are presented in **Table 3**.

Table 3 Measured Road Traffic Noise Levels

LAeq(15hour) Day	LAeq(9hour) Night	LAeq(1hour) Day
60 dBA	56 dBA	62 dBA

3.4 Aircraft Noise Levels

The potential maximum noise level at the site from the future operation of the proposed Badgerys Creek Airport, calculated in accordance with the procedures outlined in AS 2021-2000 *Acoustics - Aircraft noise intrusion - Building Siting and Construction* is 82 dBA.

4 ASSESSMENT CRITERIA

4.1 Aircraft Noise

The potential impact of aircraft noise on the proposed future development is assessed in accordance with Australian Standard AS 2021-2000 *Acoustics - Aircraft noise intrusion - Building Siting and Construction*. The recommended internal design noise level goals relevant to the proposed future use are provided in **Table 4**.

Table 4 AS 2021:2000 Recommended Acceptable Indoor Sound Levels

Building Type and Activity Schools, Universities	**Indoor design sound level LAmax, dBA**
Libraries, study areas	50
Teaching areas, assembly areas	55

These recommended internal noise levels have been used to determine in-principle control measures.

4.2 School Noise Emissions

Noise from the lecture theatre, music room, industrial arts rooms and outdoor play areas are potential sources of impact upon surrounding residential receivers.

There are no criteria specifically relating to noise emissions from educational establishments. However, Fairfield City Council has previously nominated the INP for the assessment of noise emissions during daytime and evening operations.

In this case, the area surrounding the site does not contain industrial noise sources so the (INP) Amenity Criterion becomes equal to the Recommended Acceptable Noise Level (ANL) for Residences in a Rural Area.

Applying the INP guidelines, the Project Specific Noise Levels for the various assessment periods at the nearby residences are shown in bold in **Table 5**, being the lower of either the Intrusiveness or the Amenity Criterion.

Table 5 Noise Criteria for Residences Surrounding the Development Site

Location	**Area Classification**	**Period[1]**	**dBA re 20 µPa**				
			ANL[2] LAeq(period)	**Measured RBL[3] LA90(15minute)**	**Measured LAeq(period) Noise Level**	**Criteria for New Sources**	
						Intrusive LAeq(15minute)	**Amenity [4] LAeq(period)**
Adjacent Residences	Residence -Rural	Day	50	37	59	**42**	49
		Evening	45	43	59	**48**	49
		Night	40	32	56	**37**	46

Note 1: Assessment periods are Day: 7.00 am to 6.00 pm, Evening: 6.00 pm to 10.00 pm, Night: 10.00 pm to 7.00 am.
Note 2: Recommended Amenity Criteria for Residences in a Rural Area - ANL Acceptable Noise Level
Note 3: Rating Background Level
Note 4: Assuming existing noise levels are unlikely to decrease in the future.

For assessment of night-time noise emissions Fairfield Council has previously nominated the NSW Office of Liquor, Gaming and Racing (OLGR – formerly the Liquor Administration Board, LAB) criteria. However, since no activities will be conducted at the high school after 5.00 pm, this criterion is not applicable to the proposed development.

4.2.1 Argument against INP Criteria for Assessing Outdoor Activity Noise

In the instance of noise emissions from school children involved in outdoor play, predominantly during recess and lunch breaks, we consider the process of attempting to assign a noise level to this source and then comparing it with a predetermined criterion for the purposes of assessing "offensiveness", to be inappropriate.

To the best of our knowledge, there have been no social surveys conducted to quantify the levels of noise generated from outdoor play areas of schools of varying size and type or to document the response of the surrounding community to the noise from school children engaged in outdoor play. (Whether this is due to the noise source being of a highly variable nature – making the quantification of such emissions extremely difficult – or because this source is considered to be an integral part of any school development, is a point of some conjecture.)

Whilst attempts could be made to measure the levels of noise which may be experienced at a nearby receiver, the reliability, statistical repeatability and relevance of such an assessment would always be open to question.

Noise emissions from many schools will not comply with many 'typical' (eg, "background plus 5 dBA") intrusiveness-based criteria. Being an essential part of every residential community, schools are located to permit ready access to students and, as such, are generally surrounded by residential premises. The same can also be said for schools in rural areas. An assessment based on a comparison between a measured and /or predicted level with a specific criterion may set an undesirable precedent for both existing and future schools.

Children playing outdoors will make noise and, in most cases, this will be audible at nearby residences. It is virtually impossible to quantify the level of noise received at nearby residences due to the inevitable variability of the sources (the children) and their locations. The noise level generated during recess and lunch periods will vary according to the following factors:

- the number of children with in the play area,
- the level of noise made by each student – this is obviously different from individual to individual, and various factors such as age, personality, mood, activity and countless other factors will play a part,
- the louder events are not capable of being sustained over an extended period, and
- the location of the students relevant to the residences.

There will also be other times throughout the school day when sporting activities may be conducted in this area. However it is likely that the numbers of students involved will be lower and these activities would be under teacher supervision.

We have conducted a review of Land and Environment Court cases. No judgements were found which specifically related to this type of noise source. Whether this indicates that it is not considered to be a significant acoustical issue is not clear. However, in the case of Christian Brothers v Waverley Council, which involved the use of a swimming pool, no specific criteria were mentioned but Commissioner Murrell commented that,

"It is important in our society for uses such as schools and residential areas to coexist".

In summary, the following factors apply to the assessment of noise generated by school children during outdoor play:

- the nature of the noise source is not inconsistent with that experienced within residential communities, even those which are rural /residential;
- it occurs generally during short periods throughout the day, and within school hours;
- it is not reasonable to consider that this noise source would interfere with regular domestic activities which may occur during this time; and
- the wider community benefits through the provision of the facility.

4.2.2 Satisfaction against INP Criteria

Assessment of the impact of environmental noise is not based upon satisfying 100% of the population. The criteria presented in the INP, whilst not developed for assessing community noise, have been selected to achieve acceptable conditions for approximately 90% of the population living in the vicinity of industrial noise sources for at least 90% of the time.

The Industrial Noise Policy (INP), documents the "principles underpinning the noise criteria" as follows:

> *"The industrial noise source criteria set down in Section 2 are best regarded as a planning tool. They are not mandatory, and an application for a noise-producing development is not determined purely on the basis of compliance or otherwise of the noise criteria. Numerous other factors need to be taken into account in the determination. These factors include economic consequences, other environmental effects and the social worth of the development."*

In addition, the INP states that:

> *"In those cases when the project-specific noise levels are not, or cannot be achieved, then it does not automatically follow that those people affected by the noise would find the noise unacceptable."*

4.3 Criteria for Road Traffic Noise Generated by the Development

The noise impacts of road traffic generated by the development on surrounding land uses are to be assessed in accordance with the NSW Government's *Road Noise Policy* (RNP). The RNP replaced the *Environmental Criteria for Road Traffic Noise* (ECRTN) in July 2011.

For traffic operating on public roads, to and from the subject site, the noise criteria for existing residences affected by additional traffic on existing sub-arterial roads are set out in **Table 6**.

Table 6 Road Traffic Noise Criteria

Road Category	Type of Project / Land Use	Day (7.00 am to 10.00 pm) [1]	Night (10.00 pm to 7.00 am) [1]
Freeway / arterial / sub-arterial [2] roads	3. Existing residences affected by **additional traffic** on existing freeways / arterial / sub-arterial roads generated by land use developments	$L_{Aeq(15hour)}$ 60 dBA	$L_{Aeq(9hour)}$ 55 dBA

Note 1: All criteria are external, applicable at the facade of the affected residence.

Note 2: Sub-arterial roads were previously designated as "collector roads" in *Environmental Criteria for Road Traffic Noise* (EPA 1999).

The RNP states that where existing residences and other sensitive land uses are potentially affected by additional traffic on existing roads due to land use developments, any increase in the total traffic noise level should be limited to 2 dB above the corresponding 'no build option'. (The RNP notes: "*an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person*".)

The RNP also includes "Relative Increase Criteria" of 12 dB above existing traffic noise in either the daytime or night-time. The relative increase criteria are primarily intended to protect existing quiet areas from excessive changes in amenity. As the proposed development will not result in a 12 dB increase in road traffic noise levels (an increase of this magnitude would require a 16-fold increase in traffic), the relative increase criteria are not considered further in this assessment.

4.4 Criteria for Road Traffic Noise Impinging upon the School

Clause 102 of the Infrastructure SEPP (State Environmental Planning Policy (Infrastructure) 2007), subclause 2 refers to the NSW Department of Planning's "*Development Near Rail Corridors and Busy Roads – Interim Guideline*".

Table 3.1 of the "Interim Guideline" stipulates a "Recommended Maximum Level" of 40 L_{Aeq} for "educational institutions including child care centres", but does not state the time of day or duration over which this criterion is to apply. However, the criterion is in line with that set out in the RNP of 40 $L_{Aeq(1hour)}$ for school classrooms, "when in use".

Thus, the criterion adopted for this study is that the intrusive road traffic noise to the classrooms must not exceed 40 $L_{Aeq(1hour)}$ during the normal school hours.

5 NOISE LEVEL PREDICTIONS AND ASSESSMENT

5.1 Aircraft Noise

5.1.1 Required Aircraft Noise Reduction

The noise due to aircraft operations from the proposed Badgerys Creek Airport has been estimated using AS 2021-2000 and ANEC contours provided by Fairfield City Council.

The aircraft types currently operating out of Sydney Airport were assessed for this development since Badgerys Creek may be used to supplement the services provided by Sydney Airport. The maximum aircraft noise level was estimated for Badgerys Creek Option A and B runway configurations. The maximum aircraft noise level for the school site is 82 dBA for a 747-200B Long-Range aircraft.

To achieve the AS 2021 design sound levels, Aircraft Noise Reductions (ANR) of between 27 dBA and 32 dBA are required for the library, study areas and classrooms.

5.1.2 In-Principle Treatment Recommendations

The mitigation measures outlined have been determined to meet the recommended internal noise levels during aircraft operations. The treatments recommended are in-principle only and have been selected to assess the feasibility of the proposed development. The final detailed design may be subject to trade-offs between the suitability of the assessment criteria and the Client's acoustical expectations for the various spaces.

In order to achieve the required aircraft noise reductions within the study and teaching spaces, windows will need to be closed during aircraft flyovers. An alternative means of ventilation may therefore be required to provide fresh air to the building spaces during these times.

5.1.3 Library and Study Areas

The indicative sound reduction index required for the building elements in the library and study areas together with suggested constructions that will achieve these ratings are provided in **Table 7**.

Table 7 Estimated Sound Reduction Index Required for Library and Study Areas

Building Element	Estimated Sound Reduction Index Required of Element, R_w (dBA)	Suggested Constructions
Roof/Ceiling	45	0.5 mm sheet metal roofing on timber frames separated by 150 mm gap from 10 mm plasterboard ceiling. 100 mm thick 38 kg/m^3 mineral wool bats between ceiling joists.
Walls	38	0.56 mm metal wall cladding on 92 mm steel studs with 50 mm glasswool batts (10.8kg/m^3) cavity infill and 13 mm fire-rated plasterboard internal lining, or Brick veneer construction
Glazing	33	10mm laminate in well-sealed frame

Note that these materials are indicative only and may vary between suppliers, and between test and field conditions. The exact construction should be determined during the detailed design phase of the project.

5.1.4 Teaching Spaces

The indicative sound reduction index required for the building elements in the teaching spaces together with suggested constructions that will achieve these ratings are provided in **Table 8**.

Table 8 Estimated Sound Reduction Index Required for Teaching Spaces

Building Element	Estimated Sound Reduction Index Required of Element, R_w (dBA)	Suggested Constructions
Roof/Ceiling	40	0.5 mm sheet metal roofing on timber frames separated by 150 mm gap from 10 mm plasterboard ceiling. 100 mm thick (38 kg/m$^{3)}$ mineral wool bats between ceiling joists.
Walls	38	0.56 mm metal wall cladding on 92 mm steel studs with 50 mm glasswool batts (10.8kg/m^3) cavity infill and 13 mm fire-rated plasterboard internal lining, or Brick veneer construction
Glazing	31	7 mm laminate in well-sealed frame

5.2 Noise Emissions from High School Activities

5.2.1 Materials Facility

The Materials facility is the only learning unit that is acoustically significant in terms of noise emissions to neighbouring residential properties. Fairfield City Council has previously required a report "demonstrating that all uses of the workshops at all times will meet background + 0 in octave bands 31Hz-8kHz at any location within 30m of an adjoining residence."

We have calculated the potential noise emissions from the typical use of this teaching space to the 30 m curtilage of the nearest potentially sensitive residential premises to the east, a distance of approximately 80 m from the workshop. Calculations have been based upon the proposed ground floor layout, the 7 mm laminated glazing required for aircraft noise reduction and typical wall and roof constructions (**Section 5.1.4** refers).

Noise levels generated within the Materials facility will vary depending upon the different power tools being operated. Previously measured workshop noise levels ranged between 79 dBA with an orbital sander operating to 95 dBA with an angle grinder on steel. For the purpose of demonstrating compliance, a reverberant sound pressure level of **89 dBA** was adopted for the calculation of noise breakout from the building. This level was based upon the continuous concurrent operation of several items of workshop power tools including a router, orbital sander, screw gun, panel saw, bench drill and dust extraction unit. (We consider this to be an extreme, and probably unrealistically excessively noisy, condition.)

The predicted $L_{Aeq(15minute)}$ noise level at 30 m from the nearest residential receiver to the east of the workshop is **16 dBA**. This calculation does not include any additional loss due to ground absorption but does include nominal attenuation due to directivity relative to the receiver. This level is well below the INP environmental criteria for noise emissions required by Council (of 42 dBA during the daytime – **Section 4.2** refers).

This breakout noise also complies Council's requirement of 0 dB exceedance of the background L_{A90} noise level in any octave band from 63 Hz to 8 kHz. (The 32 Hz octave band has not been assessed due to the limited availability of transmission loss data in this low (bass) frequency band. Also, having established the likely breakout at 63 Hz, it is very likely that even if noise emission in this low frequency octave band exceeds the noise criterion, it will be very close to, if not below, the human threshold of hearing at the nearest residential receiver.)

5.2.2 Music Room

The music room is located at ground level in the central area of the high school and is substantially shielded from the eastern boundary by a GLA block to the north, and the Visual Arts building to the east. Predictions of noise emissions from this room have been based upon a sound power level of 103 dBA, due to orchestral music with dominant piano. The predicted noise level at the eastern boundary with 7 mm laminated glazing required for aircraft noise reduction and typical wall and roof constructions (**Section 5.1.3** refers), is 20 dBA. This level is well below the INP environmental criteria for noise emissions required by Fairfield City Council (of 42 dBA during the daytime – **Section 4.2** refers).

5.2.3 Covered Outdoor Learning Area (COLA)

Noise emissions from the COLA will not be of any acoustical significance at the nearest residential property (approximately 140m to the northwest). 15 children talking simultaneously with a normal vocal effort would produce in the order of 27 dBA at this location – well below the INP environmental criteria for noise emissions required by Fairfield City Council.

5.2.4 General Learning Areas (GLAs)

The most exposed GLAs are located to the north of the site. Noise emissions from these buildings will not be of any acoustical significance at any of the site boundaries or to the nearest residential properties (approximately 80m to the north and east).

5.2.5 Outdoor Recreation Areas

Schools are a traditional and essential part of all residential communities. Noise emissions from students engaged in outdoor activities at the Mar Narsai High School, will not achieve a “background + 5 dBA” criterion at the site boundaries – in common with many similar educational facilities – particularly if the students are located close to the boundary.

However a 25m Landscaped Zone to the northern boundary, and a 35m wide Riparian Zone to the eastern boundary, will separate students from theses boundaries. Students will also not be allowed into the two recently purchased neighbouring properties bordering on the western boundary.

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, Monday to Friday during the relatively short school year.

Thus, as students are only likely to be active in large numbers during recess and lunch breaks, there is unlikely to be any adverse impact upon the nearest residential properties to the north and east.

5.2.6 Mechanical Noise

The noise emission of any mechanical plant associated with the high school should be controlled so that the operation of such plant does not adversely impact upon surrounding residential properties. At this stage of the project the location and selection of mechanical plant has not been made.

The plant typically installed to mechanically ventilate classrooms and the like generally comprises split air-conditioning systems. These units are typically designed for low noise emissions. The larger spaces may be serviced by packaged units. The noise emissions of such plant can generally be controlled by engineering means such as judicious location, enclosure, barriers, attenuators etc. The distances separating the high school buildings from surrounding receivers are more than adequate to ensure that the mechanical noise emissions can be successfully controlled.

It is suggested that any plant proposed to be installed should be examined at Detailed Design stage to ensure compliance with the recommended criteria for mechanical noise emissions both to the site boundaries and at sensitive receiver locations within the high school itself.

5.3 Road Traffic Noise Generated by the Development

To achieve an increase in the total traffic noise level should of 2 dB above the corresponding 'no build option' (**Section 4.3** refers) would require an increase in traffic flow (over both the day and night periods) of 60%.

With only 756 vehicles on Horsley Road east of Lincoln Road during the morning peak period, the proposed development will clearly not generate an increase in traffic flow 60% on the roads nearby.

The development will therefore comply with the RNP criteria.

5.4 Road Traffic Noise Impinging upon the School

The road traffic noise level incident upon the school (and due to the operation of the school), based upon estimated future morning peak traffic volumes presented in the traffic consultant's report, is shown in **Table 9**.

Table 9 Future AM Peak $L_{Aeq(1hour)}$ Road Traffic Noise Level Incident on the School

Location	Peak Hourly Volume	Vehicle Speed (km/h)	Receiver Location	Noise Level (dBA)	Increase in Noise Level relative to Existing Level
Horsley Rd east of Lincoln Rd	254[1]	60	Classroom nearest to road	55	NA

Note 1: The peak traffic levels prior to the school opening have been assumed for the traffic levels during school hours.

The predicted noise level at the classroom block in closest proximity to the road is 55 dBA using the existing morning peak traffic flow. The traffic noise reduction that is required to achieve an acceptable internal noise level is therefore in the order of 15 dBA. This will be achieved with the construction nominated as required to mitigate aircraft noise intrusion.

It is therefore unlikely that traffic noise will be of significance in terms of noise impact upon the development itself.

6 CONCLUSION

An assessment of the impact of noise emissions from, and noise ingress to, the proposed Mar Narsai High School, Horsley Park and has been conducted.

The impact of aircraft noise from the proposed Badgerys Creek Airport has also been addressed. Calculations conducted in accordance with the procedures outlined in AS 2021-2000 demonstrate that acceptable internal noise levels can be readily achieved within potentially sensitive spaces with the incorporation of appropriate noise control measures into the development design. The provision of an alternate means of ventilation may be necessary to allow windows and doors to be closed during noisier aircraft events.

The major sources of potential noise impact are materials facility (workshops), music rooms, the COLA, GLAs and outdoor recreation areas.

The noise level emissions from the worst-case operational scenarios of these spaces have been predicted to the site boundaries and to neighbouring rural residential premises, and compared with the criteria. All relevant criteria can be achieved by the development as proposed.

Details of mechanical plant are unavailable at this stage. However, given the site layout and the distance to neighbouring residences, achieving acceptable noise levels during plant operations is likely to be achieved with consideration given to low-noise plant selection and sensible plant location (and, if necessary, standard engineering methods).

Any increase in the total traffic noise level generated as a result of increases in vehicle movements associated with the school will be well below the EPA's recommended increase limit of 2 dBA.

Road traffic noise levels received at future classrooms closest Horsley Road will be adequately controlled with the glazing /construction nominated required to mitigate aircraft noise intrusion, and will not cause an adverse impact.