25 October 2011

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Tanner Architects
PO Box 660
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Attention: George Phillips

Dear George

Graythwaite, 20 Edward Street, North Sydney
Sydney Church of England Grammar School (Shore)
Traffic Noise Impact Assessment (Addendum to AIA Report 10-8964 R1R3)

1 Introduction

SLR Consulting Australia Pty Ltd (SLR Consulting) conducted an Acoustic Impact Assessment (AIA) for a proposed development at the Shore School, North Sydney, as part of the Part 3A application process for the Project.

A re-submission of the Part 3A application was undertaken in October 2011 which addressed concerns raised by Department of Planning and Infrastructure (DPI) and other key stakeholders in relation to the various studies conducted for the Proposal, including noise related issues.

Following re-submission, comment was received again from DPI regarding the potential road traffic noise impact from the site. This was due to further plans regarding onsite parking and pickup locations being established and presented to DPI. At the time of submission, implications of this proposal in relation to potential noise impact were not considered.

This letter report provides an assessment, specifically in relation to road and vehicle related noise impacts associated with the revised submission. The report has been prepared to address DPI concerns detailed in email correspondence dated 18 October 2011 and references the resubmitted AIA report conducted by SLR (ref: 10-8964 R1R3 dated 28 September 2011).

2 Description of Potential Noise Impacts

2.1 Proposed Pickup Facility

A new pickup facility will be located within the school grounds, with potential access off either Union Street or Hunter Crescent. Traffic flow will be one way, and will pass residential properties located on Hunter Crescent. The proposed student waiting area and pickup zone is also located adjacent to residential properties in Hunter Crescent and Union Street. Noise impacts from both vehicles and students will therefore require consideration.

The traffic impact study (produce by *Halcrow*) states this new pickup area will facilitate approximately half of the pickup traffic associated with the school operation, shared with the existing drop-off/pickup facility on Edward Street.

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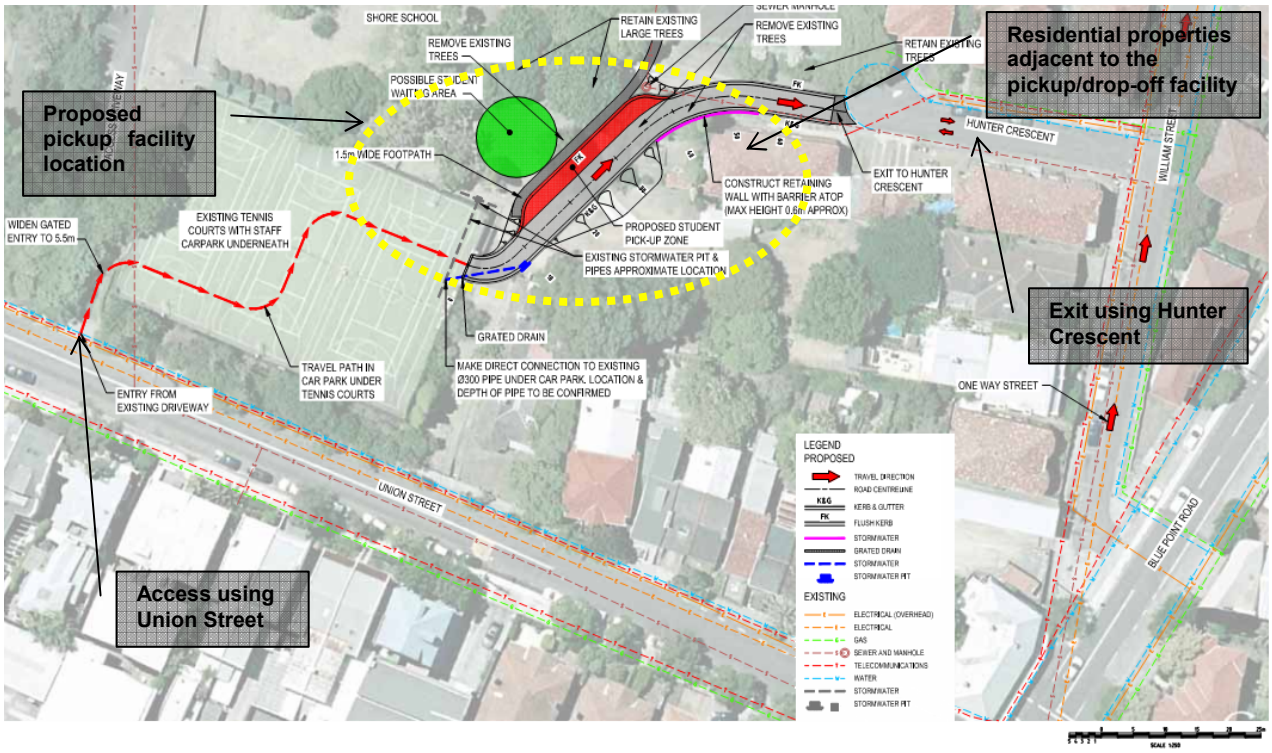
Traffic volumes associated with the proposed pickup facility have been estimated at 28 vehicle trips within a peak 15 minute period. Due to the nature of the pickup process, the pickup period may last for 30-40 minutes however the peak period where the majority of vehicles arrive commonly occurs within a 15 minute period (3:00 pm to 3:15 pm). The location of the proposed pick up facility in relation to nearest receptors is shown within **Figure 1,** (Note, **Figure 1** shows the option of access from Union Street egress into William Street. The pickup locations do not change with entry from Hunter Crescent and egress of Union Street).

Figure 1 Location of Preferred Pickup Facility (Option 2)



2.2 Proposed Car Parking

As part of Stage 2, a new car-parking facility will be constructed in the basement of the proposed East Building, providing an additional 41 spaces for staff. The East Building is located approximately 80 m from the nearest residential boundary (Kialoa at 44 Union Street).

It was highlighted in the AIA that noise impact from this building is expected to be minimal due to the distance to nearest residential locations. Notwithstanding this, the Union Street access driveway to the car park is located approximately 35 m from the nearest resident location which has potential to generate higher noise levels in comparison. **Figure 2** shows the proposed car park and existing driveway in relation to nearest resident.

Figure 2 East Building Car-park Facility

2.3 Traffic Noise Impact on Public Roads

There will be an increase in road traffic volumes on major routes to the school when all stages of the proposal are completed. Typically these impacts will occur during morning (7:30 am to 8:30 am) and afternoon (3:00pm to 4:00 pm) peak periods. Between these times, traffic noise generated by the school operation is expected to be negligible.

Due to proposed access arrangements, Union Street is likely to experience the greatest increase in traffic volumes. Hunter Crescent would currently experience low traffic volumes during peak periods, so the potential increase in traffic noise level during this period caused by the location of the pickup facility will also require consideration.

3 Noise Criteria

3.1 Onsite Operational Traffic

There is no specific noise criteria that relates directly to noise impact associated with onsite vehicle movements to nearest noise sensitive receptors. In absence of specific noise criteria available, the INP intrusive criterion is considered the most relevant objective criteria for assessing noise of this type.

Noise levels were monitored at the property boundary near the Kialoa Residence during the original AIA and were subsequently used to set INP criteria. Ambient and background noise levels at this location are considered representative of those expected at residences near to the proposed pickup facility and are therefore applicable to the assessment. This assumption has been justified due to the following reasons:

- Observations when onsite confirm that traffic is the dominant underlying noise source at the Union Street location which is most likely to set the background noise level. Distant trains were audible however due to the intermittent nature, are not likely to affect the background noise level.

- The monitoring location is of a similar set-back from Union Street (and therefore traffic noise) to those nearest to the pickup area.
- The receptors near the pickup area are closer to other collector roads such as Blues Point Road and Miller Street and are likely to experience elevated ambient noise levels in comparison to those at the monitoring location.

Project specific noise criteria used for the assessment of onsite vehicle movements are therefore provided in **Table 1.**

Table 1 Criteria for Project Specific Noise Emissions

Time of day	Noise Level dBA re 20 µPa			
	ANL[1] (period)	Measured RBL $L_{A90(15minute)}$[2]	INP Criteria	
			Intrusive	Amenity
			$L_{Aeq(15minute)}$ Criterion for New Sources	$L_{Aeq(Period)}$ Criterion for New Sources[3]
Day	60	42	**47**	60
Evening	50	36	**41**	50
Night	45	34	**39**	45

Note 1: ANL Acceptable Noise Level for an urban area
Note 2: RBL Rating Background Level from data from noise logger L3
Note 3: Assuming existing noise levels unlikely to decrease
Note 4: Project Specific Criteria are shown in bold

Further to the criteria in **Table 1** the INP also acknowledges that some noise sources may cause greater or lesser annoyance due to characteristics such as tonality, intermittency, duration etc.

In this instance the noise emission from the pickup facility is only likely to occur for 15-30 minutes within any 24 hour period during weekdays (i.e. a single event), and therefore a "Duration" adjustment factor in accordance with the INP definition is considered applicable. Details of the application of this adjustment factor are provided in **Table 2** and **Table 3.**

Table 2 Modifying Factor Corrections - Duration

Factor	Assessment/Measurement	When to Apply	Correction	Comments
Duration	Single-event noise duration may range from 1.5 min to 2.5 h	One event in any 24 hour period	0 to -20 dB(A)	Corrections to be added to the measured or predicted noise levels

Table 3 Adjustment for Duration

Duration of Event (one event in any 24 hour period)	Corrections to measured or predicted noise levels, dB(A) Day and Evening
1.0 to 2.5 hours	2
15 minutes to 1 hour	5
6 minutes to 15 minutes	7
1.5 minutes to 6 minutes	15
Less than 1.5 minutes	20

The pickup process is most likely to fall into the "15 minutes to 1 hour" category and therefore a reduction of 5 dB(A) to all predicted noise levels is considered applicable.

3.2 Criteria for Student Noise at Pickup Facility

The following is an excerpt from the Association of Australian Acoustical Consultants (AAAC) Technical Guideline for Child Care Centre Noise Assessment. Whilst not specifically prescribed to school applications, the information contained therein is considered to provide some guidance for the current study.

As the duration of time that children are allowed to play outside is reduced, the overall noise impact reduces. Therefore, it is reasonable to allow a higher level of noise impact for a shorter duration. AAAC members regard that a total time limit of 2 hours outdoor play per day (eg 1 hour in the morning and 1 hour in the afternoon) should allow an additional 5 dB noise impact.

***Up to 2 hours (total) per day** - The Leq,$_{15\ min}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 10 dB at the assessment location (i.e. **52 dBA**)*

***More than 2 hours per day** - The Leq,$_{15\ min}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location (i.e. **47 dBA**).*

This criterion has been used to assess noise emission from student activity at the proposed pickup facility.

3.3 Traffic on Public Roads

The Office of Environment and Heritage (OHE), Road Noise Policy (RNP) presents guidelines for road traffic noise assessment. The policy document provides road traffic noise criteria for proposed land use developments which have potential to cause increase in road traffic noise levels.

Table 4 presents the most relevant RNP criteria for residential developments adjacent to affected roadways, which in this instance is Union Street (Sub-arterial Road) and Hunter Crescent (Local Road). Noise levels provided in **Table 4** are external noise levels and refer only to road traffic noise; they do not include ambient noise from other sources.

Table 4 Road Traffic Noise Criteria for Residential Land Uses

Road Category	Sensitive Land Use	Criteria		
		Day 7am – 10pm	Night 10pm – 7am	Notes
Freeway/ arterial/ sub-arterial roads (Union Street)	Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial/local roads generated by land-use developments.	$L_{Aeq(15hour)}$ 60 dBA (external)	$L_{Aeq(9hour)}$ 55 dBA (external)	For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'.
Local Roads (Hunter Crescent)		$L_{Aeq(1hour)}$ 55 dBA (external)	$L_{Aeq(1hour)}$ 50 dBA (external)	

4 Assessment of Traffic Related Noise Impacts

4.1 Onsite Vehicle and Student Noise Emission

4.1.1 Student Pickup Facility

Noise levels from the proposed pickup facility have been assessed to nearest residential properties in Hunter Crescent. The following assumptions have been made in the noise assessment.

- 28 separate vehicle movements to occur throughout any 15 minute period.
- 48 students located at the pickup point, 25 % of which are assumed to be talking at one time. This is considered highly conservative as it is anticipated that the constant arrival and pickup of students would result in less students speaking at any one time.
- The nearest property boundary is assumed to be 20 m from the student waiting area and 10 m from the vehicle pickup area.
- A 2.5 m barrier has been placed along the property boundary separating the driveway from nearest receptor locations (east of pickup zone).

The following source noise levels have been used in the assessment.

Table 5 Source Sound Power Levels (Lw)

Noise Source	Typical Maximum Sound Power Level (Lw)
Car Accelerating	96 dB(A)
Car Starting	94 dB(A)
Car Door Closing	91 dB(A)
Car Moving	87 dB(A)
Students talking (12 off)	91 dB(A)

The predicted noise level from students based on the assumptions stated above was 42 dB(A) $L_{eq,15\ minute}$ which is below the criteria set from student noise emission of 52 dB(A) $L_{eq,15\ minute}$.

The predicted noise level from vehicle related noise emission is 47 dB(A) $L_{eq,15\ minute}$ (including - 5dB(A) duration correction) which meets the adjusted INP criteria of 47 dB(A).

Predicted noise levels however are subject to a 2.5 m noise barrier being constructed as stated previously. If this mitigation method is not the preferred, a negotiated agreement with nearest receptors to accept higher noise levels during the pick-up period could be sought. Please note, without the noise barrier, noise levels are predicted to be in the order of 59 dB(A) $L_{eq,15\ minute}$.

4.1.2 Union Street Access Driveway

Noise levels from cars using the driveway off Union Street to access the proposed car park have been assessed. The assessment has assumed 6 vehicles to use the driveway in any 15 minute period throughout morning or afternoon peak periods and the *car moving* Lw of 87 dB(A) (as provided in **Table 5)**.

The predicted $L_{Aeq,\ 15\ minute}$ noise level at the nearest property boundary (approx 35 m away) is 44 dB(A) which is below the INP daytime criteria of 47 dB(A). The impact from staff vehicles using this driveway is therefore not considered to adversely impact nearest residential receptors.

4.2 Increased Traffic on Public Roads

Traffic noise levels have been predicted using Calculation of Road Traffic Noise (CoRTN) algorithms which is an endorsed method of the RNP.

The most significant increase in traffic from the proposal will occur on Union Street due to the access to the proposed East Building car park and from the use of the proposed pickup facility. The exit onto Hunter Crescent will also create an increase in peak traffic volumes which will therefore increase traffic noise levels during this period.

Existing traffic volumes on public roads surrounding the site were surveyed as part of the traffic noise study for the development. For the purpose of assessment the Union Street (west of Chuter Street) morning and afternoon peak traffic flows have been used to provide a conservative approach. Surveys of existing traffic volumes on Hunter Crescent were not conducted. This street would predominantly be used by residential access and therefore the traffic volume on this road during the peak periods is likely to be negligible.

Proposed traffic generation from Stages 1, 2 and 3 from the proposal associated with the proposed basement car park and the pickup facility (taken from Table 5.1 of the traffic impact study) are summarised in **Table 6.**

Table 6 Existing and Generated Traffic Volumes

Scenario	AM Peak Hour Vehicles /hr 7:30 am to 8:30 am		PM Peak Hour Vehicles /hr 3:00 pm to 4:00 pm	
	Union Street	Hunter Crescent	Union Street	Hunter Crescent
Existing	413	-	355	-
Generated (Stage 1, 2 and 3)	21 (staff parking) 4[1] (Student drop-off)	-	21 (staff parking) 4[1] (Student pickup) 28 (Student pickup from proposed pickup area)	28 (Student pickup from proposed pickup area)
Total	438	-	408	28

Note 1: This figure is based on 3 % of the total generated trips (one-way) as provided in table 5.1 of the traffic report. The 3% is based on the breakdown of student drop-off/pickup on Union Street as provided in table 2.6 of the traffic report.

Union Street

For Union Street predictions, the facade of the nearest residential properties from the road carriageway was taken at 6 m. Predicted noise levels (including a 2.5 dB(A) façade correction) are provided in **Table 7**.

Table 7 Road Traffic Noise Predictions

Location	Period	Predicted Noise Level dB(A) $L_{Aeq(1hour)}$		Criteria dB(A) $L_{Aeq(15hour)}$
		Existing	Existing and Generated	
Nearest residence on Union Street (6 m away)	Morning Peak	68	68	60
	Afternoon Peak	67	68	60

Traffic noise impact from the school operation is most likely to occur during the morning and afternoon peak hourly periods. For this reason it is difficult to assess the predicted noise levels against the RNP criteria which is based on a 15 hourly assessment period. Notwithstanding this, the predicted increase in traffic noise levels caused by the additional traffic on Union Street is less than 2 dB(A). Therefore in accordance with guidance provided in the RNP (refer **Table 4**), the increase in road traffic noise levels during the peak periods are within acceptable limits.

Hunter Crescent

For Hunter Crescent predictions, the façade of the nearest residential properties from the road carriageway was taken at 4 m. Predicted noise levels (including a 2.5 dB(A) façade correction) are provided in **Table 8**.

Table 8 Road Traffic Noise Predictions

Location	**Period**	**Predicted Noise Level dB(A)** $L_{Aeq(1hour)}$	**Criteria dB(A)** $L_{Aeq(1hour)}$
		Generated Traffic Only	
Nearest residence on Union Street (4 m away)	Morning Peak	51	55

Traffic noise levels are predicted below the 55 dB(A) criteria and are therefore within guidance provided in the RNP.

5 Conclusion

A comprehensive assessment of road traffic and onsite vehicle related noise has been conducted for the proposed development.

Overall, the noise impact from the development was demonstrated to be within guidelines provided in relevant policy documents such as the INP and RNP.

It was however identified that noise mitigation will be required at the proposed pickup zone to reduce noise to acceptable levels at nearest residential dwellings to the east. A 2.5 m noise barrier along the east of the pickup area is therefore recommended. If this mitigation method is not preferred, a negotiated agreement to accept noise levels above the INP criteria during pickup periods could be sought.

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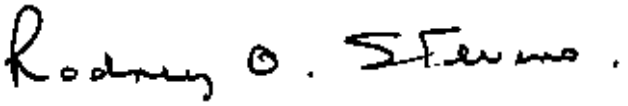
I trust the preceding meets your current requirements. If you need any further information please do not hesitate to contact me on 02 9428 8100 or email dweston@slrconsulting.com

Yours sincerely

DANIEL WESTON

Senior Consultant – Acoustics and Vibration

Checked By:



RODNEY STEVENS

Principal Consultant