# Appendix E

## Preliminary Acoustic Investigation

WILKINSON MURRAY

22 July 2010

WM Project Number: 10127
Our Ref: DRA220710 NG eltr – traffic noise
Email: l.mackenzie@draarchitects.com.au

Lia Mackenzie
DRA Architects
PO Box 6425
COFFS HARBOUR NSW 2450

Dear Lia

**Re: St Patrick's School, Macksville - Traffic Noise Impacts**

## INTRODUCTION

St Patrick's School is proposed on a vacant block of land approximately 375m to the west of the proposed Warrell Creek to Urunga, Pacific Highway Upgrade. In this vicinity, the highway is proposed to be constructed on fill, gradually increasing height to pass over the Nambucca River, to the north.

Wilkinson Murray (Sydney) Pty Limited · ABN 39 139 833 060
Level 2, 123 Willoughby Road, Crows Nest NSW 2065, Australia • **Offices in SE Qld & Hong Kong**
t +61 2 9437 4611 • f +61 2 9437 4393 • e acoustics@wilkinsonmurray.com.au • w www.wilkinsonmurray.com.au

The Environmental Assessment (EA) for the Pacific Highway Upgrade has been on exhibition recently and we have reviewed the Noise Working paper 3 prepared by Sinclair Knight Merz (SKM) on behalf of the RTA. This includes some issues which may be sensible to raise with the RTA as part of the ongoing submission process.

We have also reviewed your preliminary sketches for the school layout and building design and have included suggestions to improve traffic noise amenity within the school areas. At this stage this does not consider other conflicting design aspects.

**PACIFIC HIGHWAY ENVIRONMENTAL ASSESSMENT**

The EA addresses noise at residences in the Macksville area and includes assessment in relation to the Hibiscus Christian School which is on a block of land to the northwest of the proposed St Patrick's School (yellow dot in Aerial Photo). The report indicates the school building is approximately 550m from the proposed Pacific Highway alignment.

The EA report indicates the following vehicle numbers for daytime and night time:

- 8122 with 17% heavy vehicles at daytime; and
- 1700 with 56% heavy vehicles at night time.

We understand that the EA has nominated a low noise pavement between chainage 6600 to 11750 (approximatley 5.1km) in the vicinity of the proposed St Patrick's School.

We have undertaken a general review of the EA rather than a detailed review of the prediction process. We make the following comments.

- In adjusting predicted noise levels from $L_{A10}$ to $L_{Aeq}$ we prefer to adopt a fixed 3dB based on the traffic volumes estimated for Pacific Highway. Adopting a 4dB difference may marginally under-estimate $L_{Aeq}$ noise levels.
- The assessment has been based on assuming a 110km/hr speed limit and therefore vehicle speed. It is our experience that this speed is exceeded by a significant proportion of vehicles, such that a higher speed should be adopted for assessment purposes. Our experience has been to adopt 120km/hr at night time and 115km/hr at daytime. Again, use of 110km/hr would marginally under-estimated $L_{Aeq}$ noise levels.
- The report adopts a 2.5dBA difference between a tyned asphaltic concrete and a dense grade surface. Depending on the speed and percentage of heavy vehicles, we would normally adopt a 2.5-3dBA difference. Should the higher (3dBA) difference be adopted, again the model would marginally under-estimate $L_{Aeq}$ noise levels. For daytime levels relevant to the school the 2.5dBA correction is adequate
- The noise levels have been predicted to receivers based on a 1.5m height above ground level. This may be appropriate in flat areas but they marginally under-estimate noise levels on sloping sites where residences are built into hillsides or in flood zones and such floor level may be typically 1-2m above ground level. This would require predicting noise levels at typically 2-2.5m above ground level. Again, the EA noise model may marginally under-estimate noise levels.
- Given the relative proximity of the Nambucca River to the site, it is not clear whether the noise modelling has allowed for the influence of water rather than soft ground. This may marginally underestimate noise levels.

- In relation to the Hibiscus Christian School, the report indicates that an $L_{Aeq,1hr}$ of 55dBA should be achieved inside. This is in fact incorrect; it should be 45dBA inside and 55dBA outside. Irrespective, the predicted noise level from the EA is 52dBA which will result in an internal noise level of 42dBA assuming open windows result in a 10dBA outside to inside noise reduction. As indicated in the points above, we consider the noise levels in the EA may marginally under-predict by 1dBA; however noise levels would still comply.

- Even with the low noise pavement the predicted future noise levels at some of the nearby residences (particularly those along Gumma Road adjacent to the Nambucca River shown below) still results in exceedances of the base criterion by over 5dBA. The EA reviewed the possibility of providing a noise barrier on the western side of the Pacific Highway to further shield these residences but concluded that the noise reduction was not sufficient given the required length of barrier to meet some of the requirements of the *Environmental Noise Management Manual (ENMM)*.

- The EA stated *At Gumma Road, the alignment is elevated as it crosses the Nambucca River. The residences at this location are exposed to a long open section of the road, which would require significant lengths of noise barriers for attenuation. Noise barriers at this location do not meet the minimum requirements for cost effective implementation due to the height and the extents required to meet the project noise goals.*

- As no barrier is considered feasible and reasonable the RTA propose to offer architectural treatment to a number of residences fronting the river; however at the western extremes, no mitigation treatment is offered on the basis that existing noise levels are understood to be approximately 50dBA. It is assumed that this is a result of noise from the existing Pacific Highway on the other side of Nambucca River.

- In addressing any meteorological effects the EA concludes impacts would be small and tends to focus more on the likelihood of temperature inversions. During school hours the increase in road traffic noise under easterly breezes is more relevant and may result in increases of a few dBA.

- The EA indicates that, due to the predominately rural nature, buildings have not been included in the model when predicting noise level. This has implications for determining

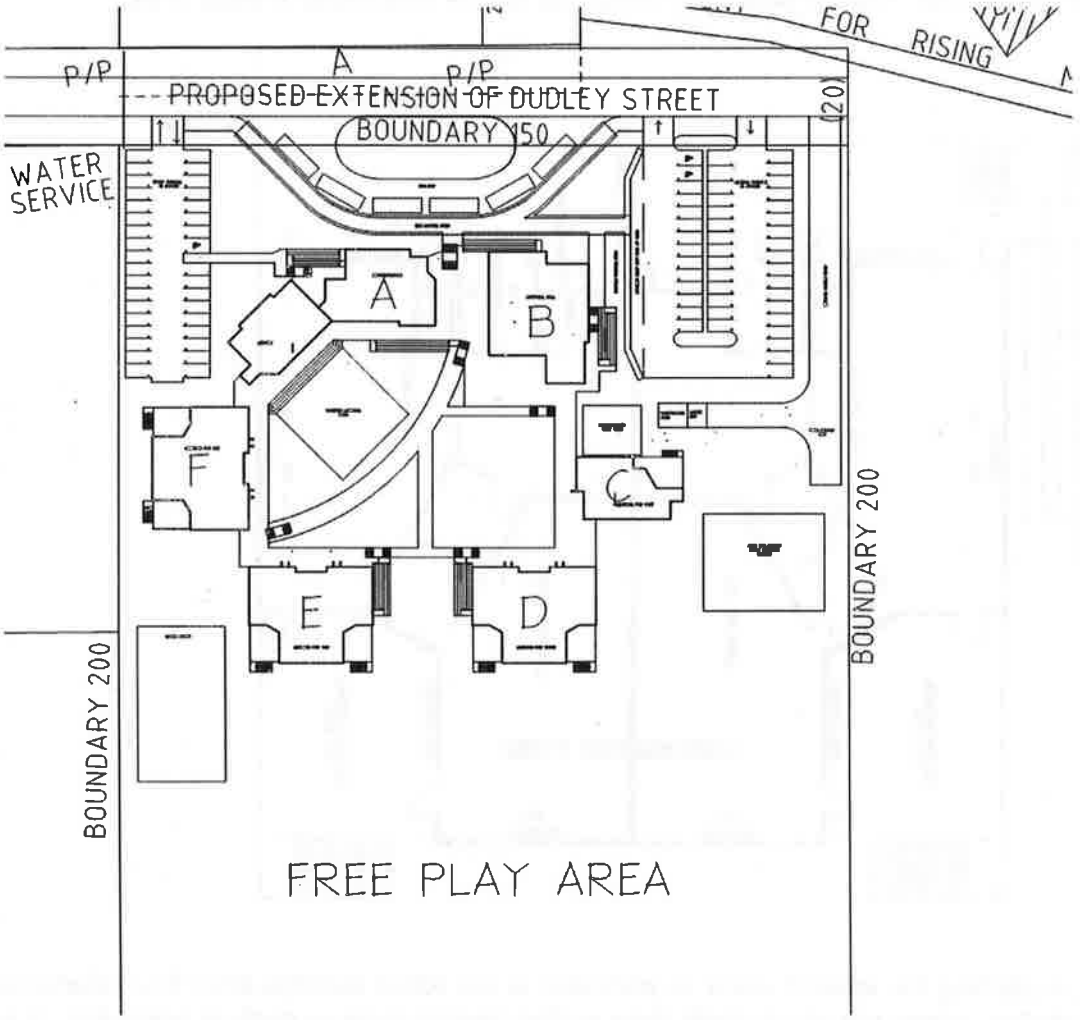
whether noise mitigation is feasible or reasonable as this decision is based on existing traffic noise levels. It is possible that at some of the residences fronting the Nambucca River ( ie 449 452 461 472 two of which are shown below), the side of the house which will face the new highway is shielded by the house itself to the noise from the existing highway as some or all emanates from other directions. If this shielding has not been allowed for in the modelling then it is possible that existing noise levels are less than 50dBA and mitigation is warranted at these residences.


Whilst the RTA should be aware of these issues and marginal under prediction, they do not directly relate to mitigation treatment for the proposed school, although if more residences require architectural treatment, the cost benefit of noise barriers on the highway would change marginally.

The noise barrier required to achieve the criteria at most of the residences to the west would need to be up to 4m high and involve significant cost due to the required length, the barrier would also need to extend over the river where views are important. We believe another option should be considered by the RTA in this area. We have been involved in projects where the height of the Type F saftey barrier (normally 0.8m high) which we would expect to be provided along the fill embankment has been increased to 1.2m high. For receivers lower than the road as is the case here, the additional height has the benefit of reducing much of the tyre/road noise generation which is the most dominant noise source at high speeds, does not involve significant increased costs over the provision of a standard Type F barrier, does not significantly reduce view loss and would not be considered to be a significant visual impact to the road. We suggest raising this issue with the RTA.

**REVIEW OF PROPOSED SCHOOL LAYOUT AND DESIGN**

The proposed building layout is shown below. Building A is admin offices, B is a community hall and C, D, E and F are classrooms. There is a propsed future early learning building near the east boundary. The nearest building is approximately 410m from the propsed Highway.



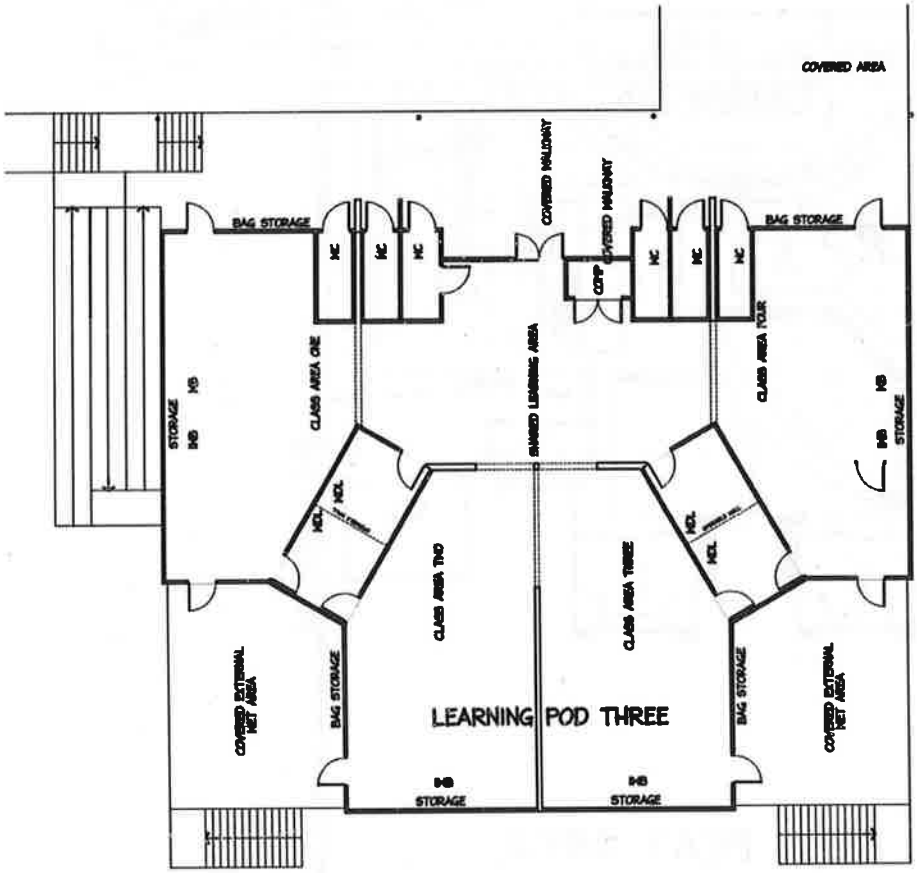

Whilst the EA did not predict noise levels at this location at residences directly to the north at a similar set back a school daytime noise level of 56dBA was predicted for a concrete road surface. It would appear our predicted noise level for the same road surface is similar, despite the issues raised above which would appear to result in some under prediction.

A quick check on predicted noise levels based on the proposed set back to the school boundary of 375m and a low noise pavement (Stone Mastic Asphalt (SMA) or Open Graded Asphaltic Concrete (OGAC)) indicates an $L_{Aeq,15hr}$ noise level of 50-52dBA. Allowing for the typical daytime hour between 8.30am and 3.30pm typically results in a 1dBA increase above the $L_{Aeq,15hr}$ noise level ie predicted levels would be 51-53dBA. This precited level complies with the ECRTN requirements of 55dBA.

The difference allowed in the EA for a low noise pavement appears to only reduce noise levels by 2dBA. This would indicate a Dense Grade Asphaltic Concrete (DGAC) or similar has been selected,

which, whilst quieter than a tyned concrete, is not normally clasified as a low noise pavement. The ECRTN requirements for schools would still be complied with based on a DGAC surface.

At the propsed set back, we do not consider traffic noise in general outdoor play areas will be an issue. However, we note a propsed outdoor learning area which is positioned as far away as practicable towards the western side of the site and then associated with each classroom is a covered outdoor learning area. Some impacts from traffic noise may be encountered in these areas.




Ideally, in planning the school it would be preferable to use school buildings other than classrooms (administration, school halls etc) to shield these outdoor learning areas as much as practicable. It is also desirable to try and use the classroom buildings to provide shielding to quieter "courtyard" areas beyond. However, with such a relatively large site this may not be ideal for other reasons.

For classrooms closest to the proposed highway it may be sensible to reorient the classrooms which have the outdoor learning areas facing east towards the road, subject to issues like solar access.

For classrooms, whilst reducing internal noise levels can always be provided by improving the sound reduction of the facade elements and roof, it is not desirable in this climate to shut windows and require air-conditioning.

If windows need to be shut, at times, then alternative air paths to provide fresh air need to be considered. However, these can be designed such that the openings do not face the road or can be acoustically "shielded" to allow air movement but attenuate noise.

We trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
**WILKINSON MURRAY**

**Neil Gross**
Director