

Queanbeyan-Palerang Regional Council

JUNE 2022

Edwin Land Parkway

Road Noise Assessment

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Edwin Land Parkway Road Noise Assessment

Queanbeyan-Palerang Regional Council

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WSP acknowledges that every project we work on takes place on First Peoples lands.

We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Executive summary

WSP has been engaged by Queanbeyan-Palerang Regional Council to conduct an acoustic assessment of a number of properties along Edwin Land Parkway. It is understood the investigation is required as a result of recommendations for the Post Construction Noise Assessment for Edwin Land Parkway, assessing traffic growth in the area, and proposed traffic variations.

Properties selected for noise assessment has been agreed with client and is based on properties predicted to exceed external noise level criteria in the post-construction noise assessment carried out by SLR Consulting.

The acoustic assessment provided in this report can be broken down in the following three parts:

- 1 Field assessments of properties and specifically the estimated road noise reduction through building envelope of existing buildings
- 2 Prediction and assessment of internal noise levels of identified properties
- 3 Recommendations on acoustic treatment that would/could apply to these properties

The focus of noise assessments carried out by WSP was to determine the road noise reduction of the facades and to make observations. The noise reduction of the façade was measured in broad accordance with *AS 1055-2018* and *AS 2702-1984*, presented in Section 3.3. During field visits observations were made regarding the façade construction, fence and room layout, presented in Appendix A.

Predictions have been made for internal noise level based on the façade assessment and predicted external noise level from the post-construction noise assessment carried out by SLR. Internal noise levels were assessed against noise criteria outlined in *AS 2107* and NSW guideline and excess determined.

Noise mitigation options in the form of quieter road pavement (most preferred) and noise barrier are typically considered feasible and reasonable to be considered if they benefit four or more closely spaced exceeding receivers. Where possible these options should be considered further. Based on information provided by QPRC, it is understood that the section of Edwin Land Parkway east of Stringybark Drive has (or will have) open graded asphalt installed. This is considered to be quieter road pavement type if properly maintained with an expected additional noise benefit of about 2 dB.

Based on observations made on site and determined excess of noise criteria the following recommendations have been made:

- It is noted that compliance to the external road noise criteria is reliant on suitable fence/ noise barrier structures on several residential properties' boundaries (e.g. Rosewood Glen). These structures should be further assessed to ensure that they are suitably sound insulating and capable of providing the modelled acoustic benefit (e.g. sufficient mass, lapped and capped fence, generally gap-free). Property details in Appendix A might serve as guidance.
- From WSP's measurements, existing building envelope constructions of the identified buildings are expected capable to provide sufficient road noise reduction to achieve the established internal noise targets.
- Mechanical fresh air ventilation (that does not compromise sound insulation through the building envelope and that meet Building Code of Australia requirements) should be explored for the identified isolated properties where external noise levels remain in exceedance of the external road noise criteria.

1 Introduction

WSP Australia Pty Ltd (WSP) has been engaged by Queanbeyan-Palerang Regional Council to conduct an acoustic assessment of several properties along Edwin Land Parkway. It is understood the investigation is required as a result of properties identified to exceed the relevant traffic noise criteria in previous noise assessments.

The acoustic assessment provided in this report can be broken down in the following three parts:

- 1 Field assessments of properties and specifically the road noise reductions achievable by identified existing buildings
- 2 Prediction and assessment of internal noise levels of identified properties
- 3 Recommendations on possible property treatment options that would/could apply to these properties

Noise mitigation in the form of quieter road pavement and noise barriers are typically preferred over property treatment. Property treatment is recommended to be considered the last resort in specific circumstances (e.g. isolated exceeding properties).

Assessed properties have been identified in the post-construction noise assessment carried out by SLR Consulting has been summarised in Table 1.1.

Table 1.1 Summary of identified properties and predicted exceedances (dB) of the NSW *Road Noise Policy* for the Year 2022

RECEPTOR	CURRENT SPEED ZONE (2022, NEW ROAD)		POTENTIAL SPEED ZONE INCREASE TO 80 KM/H	
	DAY	NIGHT	DAY	NIGHT
3/15 Ironbark Circuit (First Level)	9	6	10	8
4/15 Ironbark Circuit (First Level)	8	6	9	7
5/15 Ironbark Circuit (First Level)	9	6	10	8
6/15 Ironbark Circuit (First Level)	9	6	10	8
7/15 Ironbark Circuit (First Level)	9	7	10	8
8/15 Ironbark Circuit (First Level)	9	7	10	8
5 Bluebell Glen (Level 1)	7	5	8	6
28 Pannamena Crescent (Ground Level)	-	3	3	3
36 Pannamena Crescent (Ground Level)	-	-	3	3

The post-construction noise assessment by SLR are outlined in more detail in Section 1.1. WSP's assessment has been focused on the assessment of current speed zone (outlined in Section 1.1.1).

Exceedances of 2 dBA or less were considered as negligible by the Road Noise Policy and have therefore been excluded in the scope of this assessment by WSP.

1.1 Previous studies – Post-construction noise assessment

Outlined in this Section are the identified properties from SLR's post-construction noise assessments of Edwin Land Parkway in Jerrabomberra for the Queanbeyan-Palerang Regional Council. Two assessments have been carried out for:

- Current speed limit
- Potential speed limit increased to 80 km/h

To identify the noise affected properties the road noise traffic levels have been considered in relation to the external noise criteria within the *NSW Road Noise Policy*.

1.1.1 Assessment of current speed zone

SLR carried out a post-construction noise assessment at Edwin Land Parkway (Ref: 670.11066-R01 version 2.2, published January 2020). Based on *NSW Road Noise Policy*, residences predicted to exceed the external noise criteria were identified at Edwin Land Parkway. The properties predicted to exceed criteria for year 2022 are:

- Townhouses at 3-8/15 Ironbark Circuit (First Level)
- 5 Bluebell Glen (First Level)
- 28 Pannamena Crescent (Ground Level)

Comment on identified property on Pannamena Crescent

The identified property on Pannamena Crescent was not identified in treatment map provided by Queanbeyan-Palerang Regional Council and WSP has therefore not performed any tests at this property, a discussion regarding this property is however provided in Section 3.4.

Comment on properties on Rosewood Glen

It should also be noted that the following properties on Rosewood Glen were identified in the SLR reports published January 2020 to exceed the criteria:

- 60, 62, 64, 66 and 68 Rosewood Glen (Ground Level)

However, a subsequent SLR memo (ref: 670.11066-M01-v1.0-20220218.docx, date 18 February 2022) concludes there are no exceedances at these properties after the model was updated to include sound insulating barriers along the rear property boundary line at the height of up to 1.8 metres tall. The memo presents updated noise modelling results for which the noise model has been updated to include the existing rear fence-line in the vicinity of 56 to 68 Rosewood Glen. For informative purposes only, property details for Rosewood Glen have been included in Appendix A of this report.

1.1.2 Assessment of potential increase of speed zone to 80 km/h

SLR carried out a post-construction noise assessment due to the traffic speed variation at Edwin Land Parkway (Ref: 670.11066-R02 version 1.3, published January 2020). The assessment investigated increasing the traffic speed on the Edwin Land Parkway, Cooma Street and Old Cooma Road to 80 km/h. Increasing the speed to 80 km/h was predicted to increase the traffic noise level by approximately 1 dBA. Based on *NSW Road Noise Policy* residences predicted to exceed the external noise criteria were identified at Edwin Land Parkway. The properties predicted to exceed criteria with the increased speed zone for year 2022 are:

- Townhouses at 3-8/15 Ironbark Circuit (First Level)
- 5 Bluebell Glen (First Level)
- 28 and 36 Pannamena Crescent (Ground Level)

2 Noise Criteria

External and internal noise criteria are outlined in this Section of the report. Focus will be on the internal criteria, but external noise criteria are presented for context.

2.1 External road noise criteria

The *NSW Road Noise Policy* published 2011 (RNP) provides assessment criteria for residential land uses for different types of road categories. Edwin Land Parkway has been assessed as a sub-arterial road in accordance with the following categories:

- Redeveloped, or with additional traffic on, existing sub-arterial road
- New road

Relevant criteria for this assessment are presented in Table 2.1.

Table 2.1 Relevant external noise assessment criteria from RNP Table 3

TYPE OF PROJECT / LAND USE	ASSESSMENT CRITERIA	
	DAY ⁽¹⁾ , dBA LAeq,15-h	NIGHT ⁽¹⁾ , dBA LAeq,9-h
Existing residences affected by noise from redeveloped of, or additional traffic on, existing road	60	55
Existing residences affected by noise from new road	55	50

(1) Hours for daytime criteria: 7 am to 10 pm. Hours for night time criteria: 10 pm to 7 am

When selecting reasonable mitigation measures consideration may be given to:

- Noise impacts
 - Internal noise goals for certain rooms
 - The amount by which the criteria are exceeded, exceedances by up to 2 dB represents a minor impact considered negligible by the RNP
- Noise mitigation benefits:
 - Noise mitigation options in the form of quieter road pavement (most preferred) and noise barrier are typically considered feasible and reasonable to be considered if they benefit four or more closely spaced exceeding receivers. Where possible these options should be considered further.
 - Due to the expected environmental, visual and cost impact, the option of implementing noise barriers or mounds is not likely considered feasible and reasonable if they do not achieve a minimum noise reduction of 5 dB.
 - If noise mitigation in the form of noise barriers and quieter road pavement are considered not feasible and reasonable, considerations can subsequently be given to mitigating noise through providing appropriate internal ambient noise levels.

2.2 Internal noise criteria

2.2.1 AS 2107

Australian Standard *Acoustics – Recommended design sound levels and reverberation times for building interiors* (AS/NZS 2107:2016) recommends internal sound levels dependent on occupancy and activity as presented in Table 2.2.

Table 2.2 AS/NZS 2107:2016 recommended design sound level for Residential buildings (Table 1)

TYPE OF OCCUPANCY	TYPE OF ACTIVITY	DESIGN SOUND LEVEL (L _{Aeq,t}) RANGE
Houses and apartments in the inner city areas or entertainment districts or near major roads	Sleeping areas (night time)	35 to 40 dB
	Living areas	35 to 45 dB

2.2.2 NSW Development near rail corridors and busy roads interim guideline

The NSW Department of Planning *Development near rail corridors and busy roads – interim guideline* published December 2008 (NSW guideline) assists in reducing health impact on sensitive adjacent development. The guideline establishes noise levels that are not to be exceeded within residential properties, as presented in Table 2.3.

Table 2.3 NSW Interim guideline maximum noise levels for residential buildings (Table 3.1)

TYPE OF USE	MAXIMUM SOUND LEVEL (L _{Aeq,t})
Bedroom	35 dB ⁽¹⁾
Other areas within building (other than garage, kitchen, bathroom or hallway)	40 dB

(1) Only applicable night time: 10pm to 7 am

3 Noise assessment

Properties selected for noise assessment has been agreed with client and is based on properties predicted to exceed external noise level criteria in the post-construction noise assessment carried out by SLR, see Section 1.1.

3.1 Personnel

WSP staff undertaking the survey are suitably qualified to undertake this assessment. Individuals are members of the Australian Acoustical Society with experience of sound insulation design.

WSP is a member firm of the Association of Australasian Acoustical Consultants.

3.2 Methodology – Façade assessment

Measurements were made in accordance with *AS 1055-2018 Acoustics – Description and measurement of environmental noise* and *AS 2702-1948 Acoustic Methods of Measurement of Road Traffic Noise*.

Measurements were carried out in one-third octave bands from 20 Hz to 20 kHz. Equipment used during measurements are summarised in Table 3.1. Field calibrations were performed at the start and end of each test and no significant drift was noted (+/- 0.5 dB).

Table 3.1 Field equipment

EQUIPMENT	MANUFACTURER	MAKE	SERIAL NO	CALIBRATION DUE
Type 1 Sound Level Meter	ARL	Ngara S-pack	878179	18/12/2022
Type 1 Sound Level Meter	ARL	Ngara S-pack	878043	10/02/2023
Field calibrator	Rion	NC-74	34315156	08/04/2022

To estimate the possible road noise reduction achievable by the façade, external and internal road sound pressure level measurements are undertaken and then subtracted from each other.

For the external measurements, the microphones were placed at 1.2 to 1.5 metres above floor level of the level of interest. Microphone has been placed centrally at the façade, and when applicable at the centre of relevant glazing. Microphone has been placed as close as practicable to 1 metre from the façade.

Measurements taken inside building have been placed 1.2 to 1.5 metres above floor, at least 1 meter away from major reflecting surfaces (walls), and centrally in room. Due to the size of the rooms one measurement per room has been deemed sufficient.

Operator has been present for entire duration of measurement and meteorological conditions has been judged to have low influence on data (wind speed below 5 m/s, no periods of rain, no significant temperature fluctuations etc.).

3.3 Results

Possible road noise reduction provided by the façade are presented in Table 3.2. Details of each test location are outlined in Appendix A, including site location, room layout, façade construction, and fence.

It should be noted that internal sound pressure level measurements at 8/15 Ironbark was affected by an internal household noise source which could not be filtered out in post-processing, and it was the only available habitable room facing the road. The noise from the road was still clearly dominant but the relatively high internal background noise has limited the road noise reduction presented in Table 3.2. In absence of the internal noise source the result would likely be in line with 5/15 Ironbark Circuit since house facades facing the road were observed to be near identical.

Table 3.2 Road noise reduction through façade

RECEIVER ADDRESS	LEVEL	ROAD NOISE REDUCTION, dBA L _{Aeq}	COMMENT
Unit 5, 15 Ironbark Circuit	First Level	- 32	Façade facing road includes two operable windows
Unit 8, 15 Ironbark Circuit (based on Unit 5 measurements)	First Level	- 32	Façade facing road includes two operable windows. Internal sound pressure level measurements affected by internal household noise sources.
5 Bluebell Glen	First Level	- 29	Façade facing road includes two windows, one operable

Predictions for internal noise levels and corresponding compliance with criteria are presented in Table 3.3. Predictions for the internal noise level are based on the external noise levels predicted by SLR (see Section 1.1) and the measured road noise reduction presented in Table 3.2.

Table 3.3 Predicted internal noise level and noise excess

RECEIVER ADDRESS (LEVEL)	EXTERNAL NOISE LEVELS, dBA L _{Aeq} (SEE SECTION 1.1)		PREDICTED INTERNAL NOISE LEVEL, dBA L _{Aeq}		NOISE LIMIT AND EXCESS, dBA			
					LIVING AREA (DAY)		SLEEPING AREA (NIGHT)	
	DAY, L _{Aeq} , 15hr	NIGHT, L _{Aeq} , 9hr	DAY, L _{Aeq} , 15hr	NIGHT, L _{Aeq} , 9hr	AS 2107 (45 dBA)	NSW GUIDELINE (40 dBA)	AS 2107 (40 dBA)	NSW GUIDELINE (35 dBA)
Unit 5, 15 Ironbark Circuit (L1)	65	58	33	26	No exceedance	N/a	N/a	N/a
Unit 8, 15 Ironbark Circuit (L1)	65	58	33	26	No exceedance	N/a	N/a	N/a
5 Bluebell Glen (L1)	63	56	34	27	No exceedance	N/a	N/a	N/a

- (1) Result is limited by an internal household noise source, as mentioned previously in Section 3.3. In absence of this internal noise source, internal noise levels would be expected to be achieved.

3.4 Summary and discussion

As seen in Table 3.3, all assessed properties are predicted to achieve the internal noise levels with glazing closed.

As mentioned in Section 1.1.1 ground level of one property at Pannamena Crescent (No 38) was identified as exceeding the external noise criteria in the SLR post-construction noise assessment. In addition, if the speed zone would be increased to 80 km/h a second property at Pannamena Crescent (No 28) is also predicted to exceed the noise limit. Exceedance at both properties at Year 2022 is 3 dB over RNP daytime criteria for “New Road”.

No measurements have been performed at properties along Pannamena crescent but based on a visual inspection the properties seem to have similar façade constructions as some of the inspected properties with brick veneer or concrete façade, and single glazed windows. The worst performing façade in Table 3.2 achieved a noise reduction of -22 dBA with windows closed. Assuming that the road noise reduction performance in the building envelope is similar, the internal noise levels of the properties at Pannamena Crescent would comply with the internal noise criteria outlined in Section 2.2.

It can be concluded by the above that the building envelope for the identified properties are typically capable of providing a sufficient level of noise reduction with glazing closed. This has been measured and reported in Table 3.2 and Table 3.3.

4 Recommendations and discussions

4.1 Ironbark Circuit

The noise assessment results discussed in Section 3.3 for Ironbark Circuit receivers are based on a dense-graded asphalt pavement type. Based on information provided by QPRC, it is however understood that the section of Edwin Land Parkway east of Stringybark Drive has (or will have) open graded asphalt installed. This is considered to be quieter road pavement type if properly maintained with an expected additional noise benefit of about 2 dB. This will help reduce the level of external noise exceedances currently reported. With open graded asphalt, the external noise levels remain approximately 8 dB and 6 dB in exceedance of the day and night time criteria respectively.

With regard to potential use of noise barriers, due to the significant structure necessary to provide sufficient shielding for the exceeding level one receivers, this is not considered to be a feasible option.

Therefore, noise mitigation in the form of property treatment is recommended to be considered to address the residual exceedances. Further discussions are provided in Section 4.3.

4.2 Other properties (Pannamena Crescent, Bluebell Crescent)

As the remaining exceeding properties are generally isolated (i.e. not four or more adjoining exceeding properties) noise barriers are not likely to be considered feasible and reasonable.

Therefore, noise mitigation in the form of property treatment is also recommended considered. Further discussions are provided in Section 4.3.

4.3 Property treatment

From WSP's measurements, existing building envelope constructions of the identified buildings are expected capable to provide sufficient noise reduction to achieve the established internal noise targets.

The option of providing mechanical fresh air ventilation that meets Building Code of Australia requirements is therefore recommended. Such ventilation system should be designed carefully so that sound insulation in the building envelope is not compromised. Based on the measured results, other forms of modifications to the buildings do not appear to be necessary (e.g. glazing upgrade).

Based on a limited research undertaken by WSP, possible ventilation system options that can provide a level of fresh air ventilation are listed below (subject to further review for BCA compliance if necessary):

- Acoustica Aeropac: <https://www.acoustica.com.au/product/aeropac/>
- Soundscoop <https://www.passivent.com/app/uploads/2022/01/SoundScoop%C2%AE-Brochure.pdf>
- Renson Invisivent <https://www.renson.eu/gd-gb/producten-zoeken/ventilatie/raamverluchtingen/roosters-op-het-raam/invisivent-ut>
- Silence air: <https://silenceair.com/>
- Ventient: <https://proctorgroup.com.au/ventient-2/why-ventient/>

5 Conclusion

WSP has been engaged by Queanbeyan-Palerang Regional Council to conduct an acoustic assessment of several properties along Edwin Land Parkway. It is understood the investigation is required as a result of recommendations from the Post Construction Noise Assessment for Edwin Land Parkway, assessing traffic growth in the area, and proposed speed variations.

Properties selected for noise assessment has been agreed with client and is based on properties predicted to exceed external noise level criteria in the post-construction noise assessments carried out by SLR, see Section 1.1.

The focus of noise assessments carried out by WSP was to determine the road noise reduction provided by the existing building envelope and to make relevant observations. The road noise reduction of the façade was assessed in accordance with *AS 1055-2018* and *AS 2702-1984*, presented in Section 3.3. During field visits, observations were made regarding the façade construction, fence and room layout, presented in Appendix A.

Predictions have been made for internal noise level based on the façade assessment and predicted external noise level from the post-construction noise assessment carried out by SLR. Internal noise levels were assessed against noise criteria outlined in *AS2107* and relevant NSW guidelines.

It is concluded that for all assessed properties the building envelope is capable of providing sufficient levels of noise reduction with glazing closed. As such, the design of the ventilation for these rooms should be such that occupants can leave windows/doors closed if desired.

Based on observations made on site and the determined excess of noise criteria the following recommendations have been made:

- For the properties at 15 Ironbark Circuit, with quieter road pavement (open graded asphalt) already implemented and noise barriers considered not feasible and reasonable, noise mitigation in the form of property treatment (outlined in Section 4.3) is recommended considered to address the residual exceedances of the external noise criteria.
- The exceeding properties on Pannamena Crescent and Bluebell Glen are generally isolated, therefore noise barriers are not likely to be considered feasible and reasonable. Noise mitigation in the form of property treatment is recommended to be considered, outlined in Section 4.3.
- It is noted that compliance to the external road noise criteria is reliant on suitable fence/ noise barrier structures on several residential properties' boundaries (e.g. Rosewood Glen). These structures should be further assessed to ensure that they are suitably sound insulating and capable of providing the modelled acoustic benefit (e.g. sufficient mass, lapped and capped fence, generally gap-free). Observations reported in Appendix A might serve as guidance.