Grannie Annies, Sunderland

Noise Impact Assessment

6926.1

18th February 2021

Revision B

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Revision	Description	Issued by	Date
A	First issue	AG	18th July 18
B	Revised layout	RH	18th Feb 21

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1 Contents

2 Summary

2.1 A balcony extension to Grannie Annies, Sunderland has been proposed.

2.2 The Local Authority is concerned about the noise impact associated with patron noise and music noise on the balcony. They are also concerned about music noise break out from the venue through the proposed door which provides access to the balcony.

2.3 A background noise survey has been conducted and a criterion proposed to address the concerns of the Local Authority.

2.4 It is calculated that on the basis of 27 people using the balcony simultaneously that the suggested noise impact criteria can be achieved.

2.5 On the basis of internal music noise levels equivalent to that of a music bar or night club, the noise break-out from the venue though an open balcony door achieves the proposed criteria.

2.6 Limits for external music have been calculated based on a pair of stereo speakers. Each speaker should not exceed a noise level of 75 dB(A) when measured at one metre from the front of the speaker. This noise level is suitable for low level background music only.

3 Introduction

3.1 An outdoor balcony has been proposed at Grannie Annies in Sunderland.

3.2 The site location indicating the position of the proposed balcony and most exposed residential are shown in Figure 1.

3.3 Apex Acoustics has been commissioned to undertake a noise impact assessment to address the concerns of the Local Authority.

3.4 This assessment is based on measurements of existing noise and assumptions with respect to external patron noise and music noise both within the building and on the balcony.

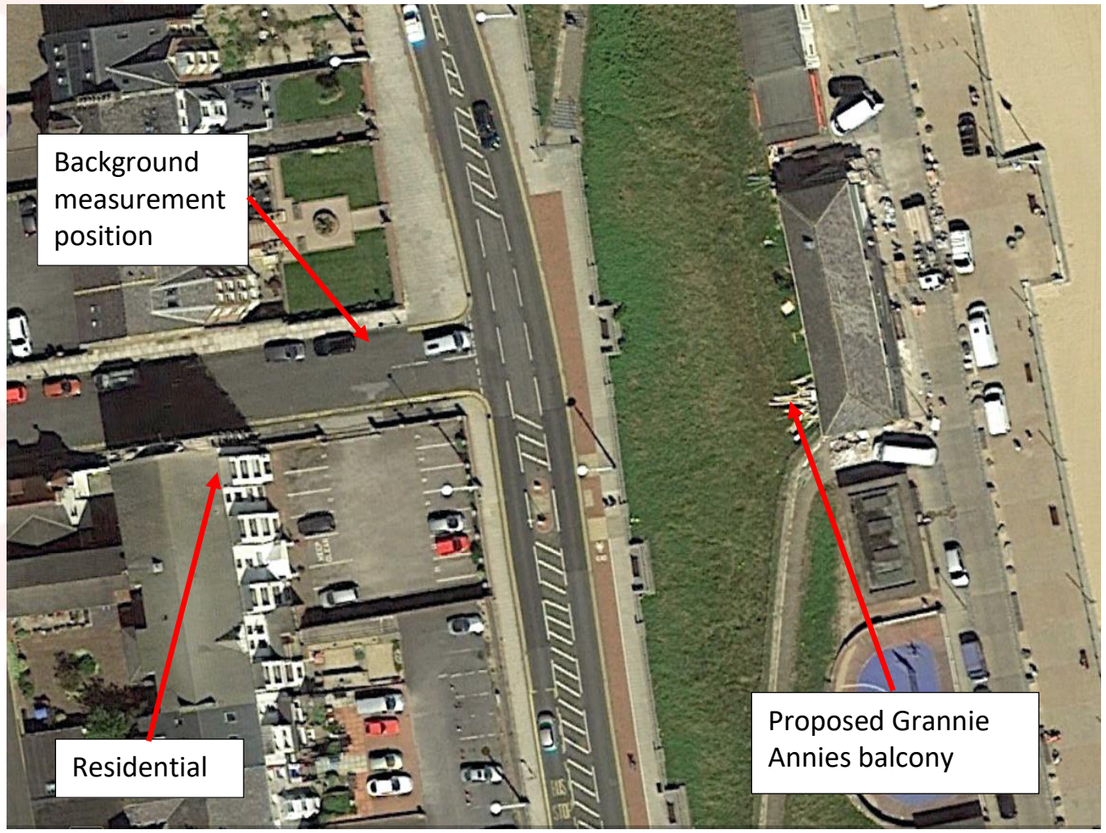

Figure 1: Site location and measurement position

4 Background Noise Measurements

4.1 It is understood that the balcony is proposed to be open between 09:00 hrs and 21:00 hrs.

4.2 Therefore, measurements of the existing noise environment were made between 21:00 hrs and 23:00 hrs on the 9th July 2018 at the position indicated in Figure 1.

4.3 Measurements were made with the microphone located at 1.5 m above ground level and at least 3 m from other reflecting surfaces, such that they are considered to be free field.

4.4 An illustration of the measurement in progress is shown in Figure 2.

Figure 2: An illustration of measurements in progress

4.5 The time history of the measured $L_{Aeq,\ 1\ sec}$ recorded is shown in Figure 3.

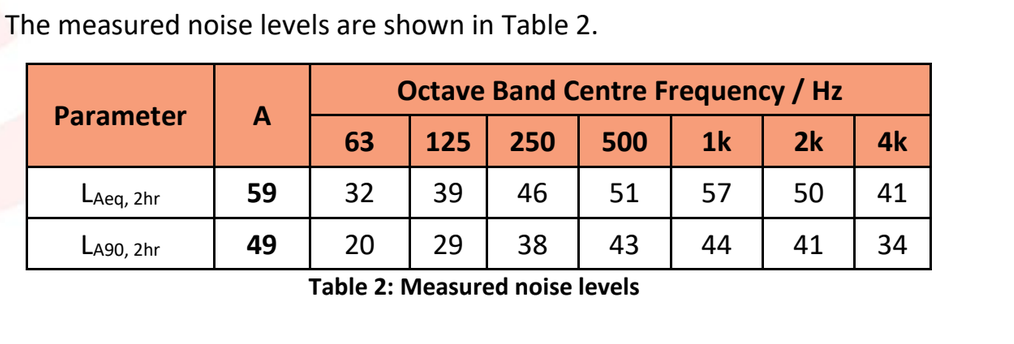

Figure 3: Time history of measured $L_{Aeq,1sec}$

4.6 The equipment used is listed in Table 1.

Equipment	Model	Serial no.
Sound Level Meter	XL2	A2A-12479-E0
Calibrator	Larson Davis CAL 200	13405

Table 1: Equipment used

4.7 Both meter and calibrator have current calibration certificates traceable to national standards.

4.8 The measured noise levels are shown in Table 2.

Parameter	A	Octave Band Centre Frequency / Hz						
		63	125	250	500	1k	2k	4k
$L_{Aeq,\ 2hr}$	**59**	32	39	46	51	57	50	41
$L_{A90,\ 2hr}$	**49**	20	29	38	43	44	41	34

Table 2: Measured noise levels

5 Local Authority Requirements

5.1 Local Authority Correspondence

5.2 Correspondence from the Local Authority has identified three potential noise issues that are of concern. The correspondence received from the Local Authority has been reproduced as shown below:

There are 3 potential issues that need to be addressed given the nearby proximity of residential premises;

1. Patron noise (conversation, laughing, shouting etc) – anticipated numbers of patrons/tables/chairs etc may assist in the assessment of impact
2. Music noise provision on the balcony – ANY music provision should be supported by a noise impact assessment undertaken by a competent person. The Assessment should demonstrate that music noise is inaudible at the nearest residential premises. Further information in this respect can be provided by PPRS
3. Music noise escape from the main premises via the balcony access door.

5.3 Proposed criteria - patron noise

5.4 It is understood that the balcony is proposed to be open during the daytime between 09:00 hrs and 21:00 hrs. It is suggested therefore that noise levels within living room and bedroom of nearby noise sensitive properties from Patrons using the balcony complies with the requirements in BS 8233, Reference 1, for daytime noise of 35 dB $L_{Aeq,T}$.

5.5 The noise reduction due to open windows is generally around 10 - 15 dB, therefore it is suggested as a prudent assumption that to achieve the BS 8233 internal noise level requirement the free field noise level on the façade of the most exposed residential during the opening times is limited to 45 dB $L_{Aeq,T}$.

5.6 This approach is consistent with the noise criterion for similar developments accepted by Sunderland Local Planning Authority.

5.7 Proposed criteria - music noise

5.8 It is suggested that music noise is limited to a level 10 dB below the measured background noise level of 49 dB $L_{A90,2hr}$ i.e. ≤ 39 dB $L_{Aeq,T}$ at the façade of the nearby noise sensitive properties.

5.9 Apex Acoustics have previously liaised with the Local Authority regarding the inaudibility requirement and the suggested noise criterion is considered to be consistent with similar developments accepted by Sunderland Local Planning Authority.

5.10 Proposed criteria summary

5.11 The proposed assessment criteria is summarised in Table 3.

Noise source	Receptor	Criteria	Comments
Patron Noise	Residential on Roker Terrace	≤ 45 dB $L_{Aeq,T}$ i.e. to achieve BS 8233 guideline level of 35 dB $L_{Aeq,T}$ in Living Rooms and Bedrooms during the daytime with open windows	Free-field level at façade of most affected residential
Music noise breakout though balcony access door		≤ 39 dB $L_{Aeq,T}$ i.e. music noise limited to 10 dB below measured background $L_{A90,2hr}$	
Music noise on balcony			

Table 3: Summary of noise assessment criteria

6 Calculated noise impact

6.1 Noise modelling

6.2 Noise transmission and propagation is modelled using proprietary software, Cadna/A, Reference 2. This models noise propagation outdoors according to ISO 9613, Reference 3.

6.3 The parameters used for the noise model are shown in Appendix 1. A 3D view of the noise model is shown in Figure 4.

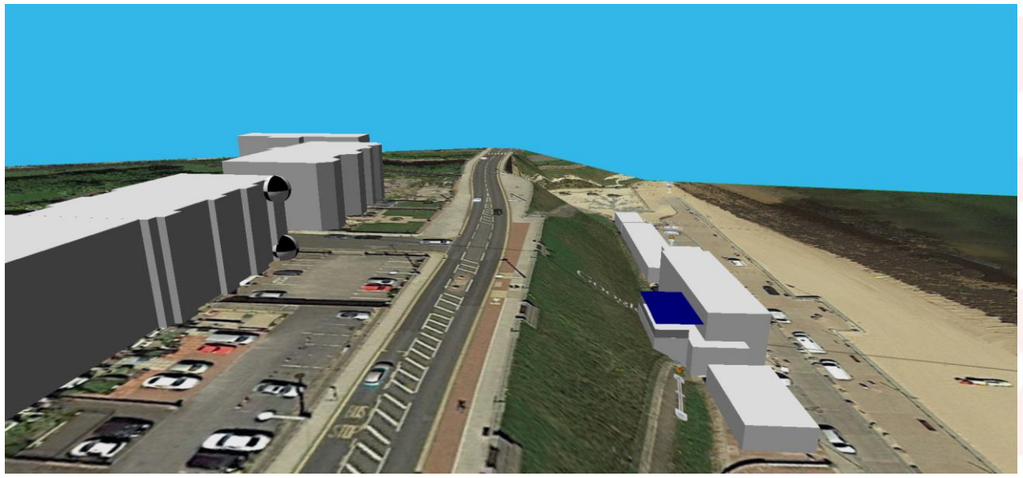

Figure 4: 3D view of CadnaA model

6.4 Patron Noise

6.5 Speech spectral linear sound power levels calculated for a loud voice in octave bands based on the guidance in ANSI 3.5, Reference 5, is shown in Table 4.

Parameter	dB(A)	Octave Band Centre Frequency / Hz						
		63	125	250	500	1k	2k	4k
Loud voice	**83**	52	63	72	80	80	73	66

Table 4: Linear sound power octave band levels of a loud voice

6.6 These sound power levels are also consistent with those defined in Table A.1 in BS EN ISO 9921, Reference 4.

6.7 It is assumed for this assessment that the balcony contains 27 people of which simultaneously 9 have a 'loud' vocal effort.

6.8 To determine the sound power level for multiple people the following equation has been used:

$$L_{w,\ n\ people} = L_{w,\ 1\ person} + 10\log_{10}(n)$$

where n is equal to the number of people with loud vocal effort

6.9 Noise emanating from the external balcony is modelled as an area source covering the whole of the balcony at 1.8 m above floor level.

6.10 A plan view of the noise model with the graphical results at 10.5 m above the ground showing noise emanating from patron is shown in Figure 5.

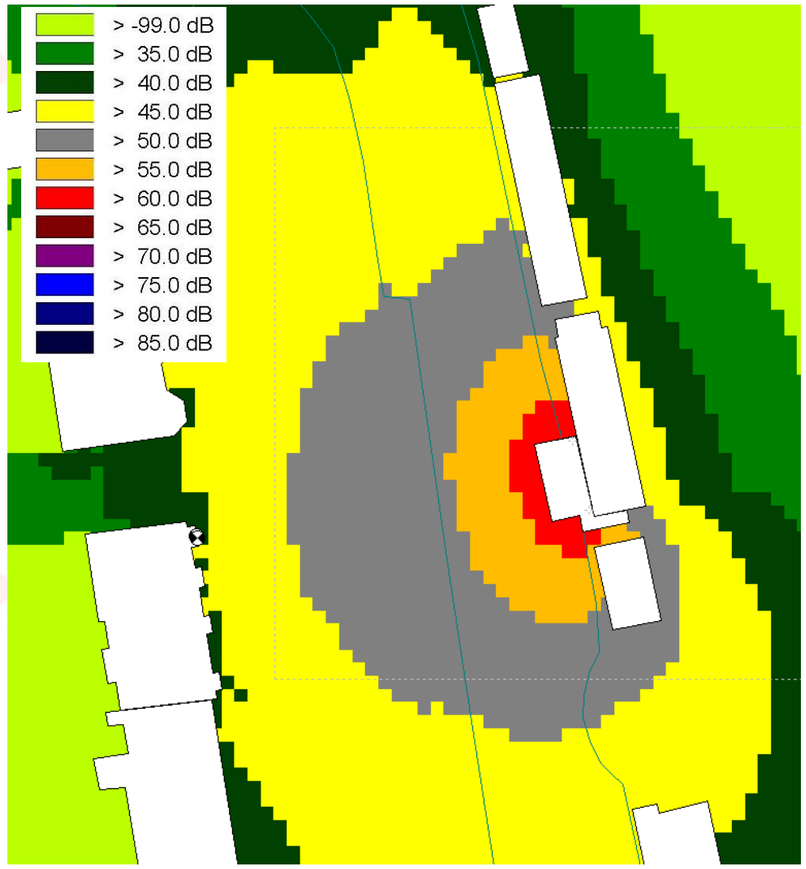

Figure 5: A-weighted noise contours from patron noise

6.11 The noise level is consistent with should be noted that the noise level limit suggested from Patron noise is below the measured background noise level.

6.12 A summary of the calculated free-field external noise level at the noise sensitive receptors is shown in Table 9.

Parameter	Calculated free-field external level $L_{Aeq,T}$ / dB	Criteria $L_{Aeq,T}$ / dB
Ground Floor	36	≤ 45
Fourth Floor	44	

Table 5: Calculated noise levels due to patron noise

6.13 **Internal Music Noise**

6.14 The Little Red Book of Acoustics, Reference 6, provides guidance on typical noise levels for Music Bar/Nightclubs as shown in Table 6.

Parameter	Octave Band Centre Frequency (Hz)							dB(A)
	63	125	250	500	1k	2k	4k	
Music Bar/Nightclub	110	110	100	100	95	90	85	101

Table 6: Typical noise levels within bar and restaurants, linear octave band spectrum

6.15 The noise level within Grannie Annies are assumed to be as high as those of a music bar/night club.

6.16 The stair well lobby between the main function spaces and position of the balcony door will reduce the noise level significantly. A 15 dB reduction in noise due to this lobby is assumed which is considered to be prudent.

6.17 The balcony door is assumed to be open for the assessment as a prudent assumption.

6.18 **External Music Noise**

6.19 External music noise is assumed to be reproduced from two speakers i.e. a stereo pair. The assumed noise level when measured at 1 metre from the front of each speaker is as indicated in Table 7.

Parameter	Octave Band Centre Frequency (Hz)							dB(A)
	63	125	250	500	1k	2k	4k	
Noise level at 1m from external speaker	85	85	75	75	70	65	60	76

Table 7: Assumed noise level from external speakers measured at 1 m

6.20 A plan view of the noise model with the graphical results at 10.5 m above the ground showing noise emanating from the internal music noise and external speakers is shown in Figure 6.

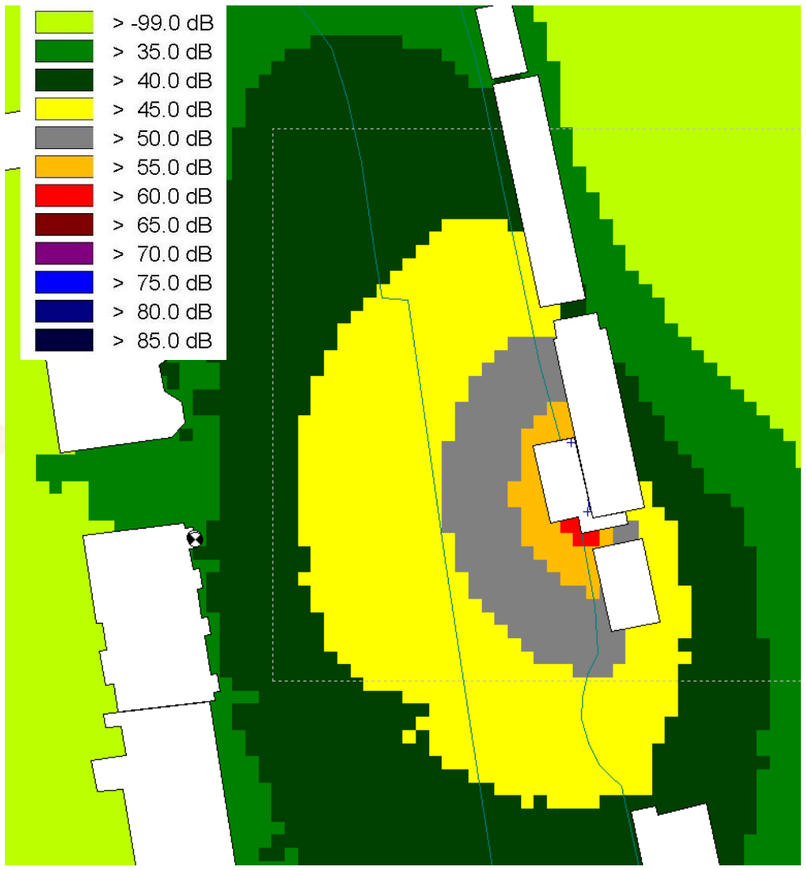

Figure 6: A-weighted noise contours from external and internal music noise

6.21 A summary of the calculated free-field external noise level at the noise sensitive receptors is shown in Table 8.

Parameter	Calculated free-field external level $L_{Aeq,T}$ / dB	Criteria $L_{Aeq,T}$ / dB
Ground Floor	33	≤ 39
Fourth Floor	38	

Table 8: Calculated noise levels due to internal and external music noise

7 Conclusion

7.1 A balcony extension has been proposed to the Grannie Annies venue in Sunderland.

7.2 A set of noise impact criteria to address the concerns of the Local Authority have been suggested.

7.3 On the basis of the assumptions contained within this report is considered that the suggested noise impact criteria can be achieved.

8 References

1 BS 8233: 2014, Guidance on sound insulation and noise reduction for buildings.

2 Cadna/A environmental noise modelling software, version 2018, Datakustik GmbH.

3 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors

4 BS EN ISO 9921:2003 Ergonomics - Assessment of speech communication

5 ANSI S3.5-1997, Methods for the calculation of the Speech Intelligibility Index (SII)

6 The Little Red Book of Acoustics: A Practical Guide, First Edition, BTA, 2007.

7 Architects Drawings, GA-21-04 Existing & Proposed Layouts Planning, Feb ’21, My Perspective.

9 Appendix 1: Noise modelling parameters

9.1 The parameters used, source of data and details are described in Table 9.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Architect's drawings	Architects drawings, Reference 7
Topography – within site	Site observations, architect's drawings and Google Street view	Modelled with slope of embankment
Topography – Outside of site	Site observations, architect's drawings and Google Street view	Modelled with slope of embankment
Building heights – proposed buildings	Drawings	Architects drawings
Building heights – outside of site	Site observations and Google Street view	3 m per storey (residential properties)
Receptor positions	Site observations and Google Street view	On the façade closest to the source at a height of 1.5 m and 10.5 m to represent ground and fourth floor window heights respectively
Building and barrier absorption coefficient	ISO 9613-2	0.21 to represent a reflection loss of 1 dB
G, Ground factor	ISO 9613-2	Hard ground, G = 0
Max. order of reflections	Apex Acoustics	Three

Table 9: Modelling parameters and assumptions