

BE/29/20/DAC

Acoustic Associates Sussex Ltd

Planning Condition Noise Assessment

Site: **Bersted Park, Phase 4C**

Client: **Berkeley Homes**

Report by: **George Orton BEng(Hons) MIOA**

Date: **17/02/2020**

Project: **J2891**



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1 Introduction

Acoustic Associates have been appointed to undertake an acoustic assessment of the proposed Bersted Park, Phase 4C development.

The development has gained planning approval albeit with certain conditions. The planning condition, which relates to noise, can be seen later on in the report.

Environmental (road vehicles) noise has been measured close to where the development will be built.

The report assesses the following:

- Noise levels affecting the proposed development.
- Mitigation Measures to reduce internal noise levels so that the planning condition noise criteria can be achieved.

Noise propagation around the proposed development has been predicted using the computer program IMMI (Wolfel).

The noise levels for the day and the night time period have been assessed in terms of and following the guidelines of the documents listed below:

- BS8233 (Sound insulation and noise reduction for buildings) 2014
- ISO9613 (Attenuation of sound during propagation outdoors) 1996

Noise mitigation measures have been recommended and if they are implemented by the developer it is considered that the planning condition criteria will be achieved.

2 Context, Planning Condition and Noise Criteria

2.1 Context

Phase 4C is within the larger Bersted Park development. Within Phase 4C seven additional houses will be built. The houses front facades face the B2259 road (Chichester Road)

2.2 Condition

The development has gained planning approval, albeit with certain conditions. The planning condition which relates to noise has been copied below:

"No development above DPC level shall take place unless and until a scheme to demonstrate that the internal noise levels within the residential units will conform to the "indoor ambient noise levels for dwellings" guideline values specified within Table 4 under section 7.7.2 of BS 8233:2014. Details comply by a competent acoustician on sound insulation and noise reduction for buildings shall be submitted to and approved in writing by the LPA. The scheme should take into account the correct number of air changes required for noise affected rooms. The works specified in the approved scheme shall then be carried out in accordance with the approved details prior to occupation of the premises and be retained thereafter."

2.3 Criteria

Based upon the wording of the condition it is recommended that criteria are provided by:

- BS8233 (Sound insulation and noise reduction for buildings) 2014

Calculations of noise propagation will follow the principles detailed within:

- ISO9613 (1996) Attenuation of sound during propagation outdoors

Calculations of noise break-in have been completed using the computer program INSUL which follows the principles detailed within:

- BS EN ISO 12354-1:2017 Building acoustics - estimation of acoustic performance of buildings from the performance of elements.

2.4 BS8233 2014 Noise Criteria

Table 5 of BS8233 provides the following guideline values:

Activity	Location	Time period of day	
		07:00-23:00	23:00-07:00
Resting	Living Rooms	35dB L _{Aeq,16hour}	-
Dining	Dining Room/Kitchen	40dB L _{Aeq,16hour}	-
Sleeping (daytime resting)	Bedroom	35dB L _{Aeq,16hour}	30dB L _{Aeq,8hour}

Table 1: BS8233 2014 Criteria

3 Unattended Noise Survey Baseline Conditions and Results

An unattended noise survey was carried out from the 07/02/2010 to the 08/02/2020 in order to measure noise levels affecting the proposed development. Noise measurements were conducted on top of the site hoarding fence.

The survey was going to run until the 12/02 however high wind-speeds rendered the latter part of the survey data unusable (weather deteriorated Saturday night on the 08/02)

The noise monitoring location can be seen in the marked up plan in the appendix.

3.1 Baseline Conditions

- Survey carried out by: George Orton BEng (Hons) MIOA
- Equipment used: 01dB SIP95 - Type 1 Sound Level Meter
- Weather conditions: Variable

Meters were calibrated before and after commencing the noise measurements (@94dB no drift). The microphone was approximately 3 m from the ground and well away from any other reflective surfaces with the exception of the solid sheet timber fence below. As the reflective surface was not behind the microphone the results will be classified as freefield. This may result in noise levels that are marginally higher than a true freefield value.

All noise levels in the report, including those predicted by the noise model, will be free-field unless stated otherwise. The noise model predicts what are sometimes referred to as "incident" sound levels (freefield level close to a building façade).

3.2 Noise Survey Results and Discussion

At this position the dominant noise source is the road. The survey data has been used to calculate the 16hr day time and the 8hr night time period noise levels:

Date	Day	Freefield dBA	
		L _{Aeq,07:00-23:00hrs}	L _{Aeq,23:00-07:00hrs}
07/02/2020	Friday	64*	60
08/02/2020	Saturday	64	-

Table 2: Unattended Noise Survey Levels

* Survey Started at 09:00hrs and to make a full 16hrs the hour noise level from 09:00-10:00 was used for 07-08:00hrs and 08-09:00hrs.

4 Computer Noise Model

4.1 Noise Model Methodology Computer Noise Model

In order to see how noise varies at different positions around the proposed development it is possible to produce a noise contour map.

A computer noise model has been completed using the computer package IMMI. The survey data and drawings of the proposed development have been used to complete the noise models. IMMI faithfully implements the propagation method of ISO-9613:1996; Acoustics – Attenuation of sound during propagation outdoors.

4.2 Road Noise – Survey Model Methodology

A reception point was added to the model at the plan/height corresponding to the unattended noise survey position. The timber hoarding fence below was also added. Reception points (RPs) predict the noise level at a discreet position within the noise model space.

Buildings within the wider Bersted Park development, that have already been built, were also added to the model.

The B2259 road was then added to "Survey" noise model as a line source. The line source day/night time sound power was adjusted until the level at survey reception point (RP) equaled the levels detailed in section 3.2. The survey model has been copied into the appendix of the report.

4.3 Transport Noise – Development Model Methodology

The proposed development buildings were then added to the model. The temporary hoarding fence was removed. The daytime noise model can be seen below:

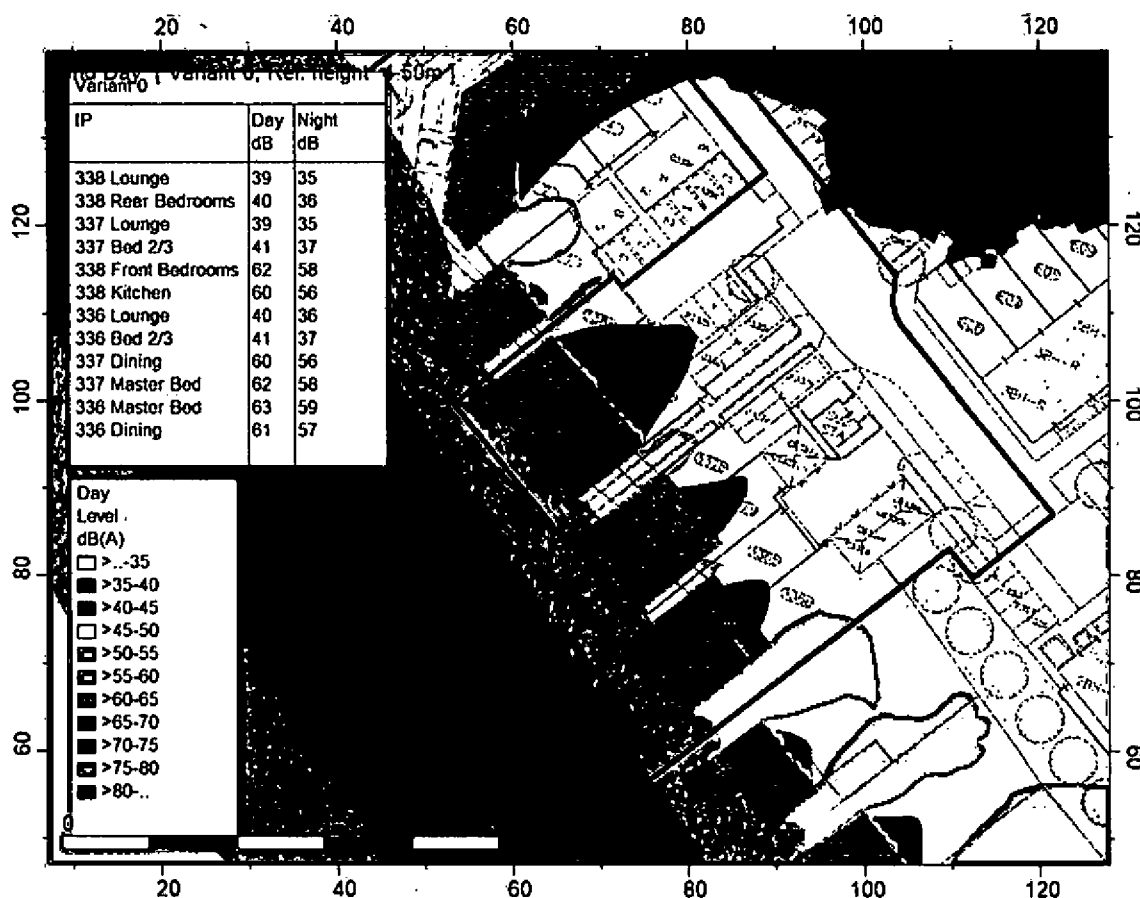


Figure 1: Development Noise Model

5 Mitigation Measures and Conclusion

5.1 Required Sound Insulation of Building Envelope

The noise model predictions have been used to demonstrate minimum building envelope sound reduction (SRI) required so that the BS8233 criteria can be achieved (for bedrooms the night time level and target has been included. If this is achieved the daytime target will also be achieved with 1dB to spare):

Location	External Noise Level dBA	Required Indoor Noise level dBA	Required SRI dB
337 Lounge	39	≤35	4
337 Dining	60	≤40	20
337 Master Bed	58	≤30	28
337 Bed 2/3	37	≤30	7
336 Lounge	40	≤35	5
336 Dining	61	≤40	21
336 Master Bed	59	≤30	29
336 Bed 2/3	37	≤30	7
338 Kitchen	60	≤40	20
338 Front Bedrooms	58	≤30	28
338 Rear Bedrooms	36	≤30	6
338 Lounge	39	≤35	4

Table 3: Required SRI

5.2 Glazing/Trickle Vents

The requirements for glazing and trickle vents have been detailed in the table below:

Plot	Facade	Room	Glazing R_w+C_{tr} ¹	Vent $D_{n,e,w}$ ²	Calculated/Required SRI
All	Front	Bedrooms	30dB	38dB	30/29
All	Front	Kitchen/Diner	30dB	29dB (Standard) ³	
All	Rear	All	Standard ⁴	Standard ⁴	OK with open windows

Table 4: Glazing and Ventilation Requirements

¹The glazing performance in the table above has been specified in terms of R_w+C_{tr} (sometimes referred to as $R_{traffic}$). This is a different metric to R_w which will generally be higher than the R_w+C_{tr} for the same product.

²The $D_{n,e,w}$ in the table relates to the performance for a single vent based on there being 2 ventilators in the window

³A standard trickle vent should achieve the required $D_{n,e,w} = 29dB$ target.

⁴At the rear of the properties standard glazing and ventilators will be suitable. The BS8233 criteria can be achieved even if the windows were open.

5.3 Calculation Details

The SRI calculations were completed for the worst case rooms using the program INSUL. The calculations took into account the following (full prediction sheet can be found in the appendix of the report.

- Traffic ISO717 curve used to match the model predicted broadband A-weighted level.
- Reverberation time assumed to be 0.5s (probably predicts worst case in bedrooms where measured RT is often lower)
- Window area and insertion loss (taken from basic Velfac window)
- Room Volume
- Masonry façade area and insertion loss (Block/block cavity wall)
- 2 trickle vents per window (Calculation only allows Rw as input so an area of 10m² has been added for each ventilator). Insertion loss taken from RW Simon test data.

5.4 Proposed Glazing

It is proposed that "Optima by Profile 22 Systems" windows will be installed. It is understood that the basic double glazed unit achieves an Rw+Ctr of 32 dB (36-4).

This will be suitable for all windows including the front façade windows which face the road.

5.5 Proposed Trickle Vents

The proposed trickle vents are to be confirmed. However the following would be acceptable to use (Example products that were detailed in calculations):

- $D_{n,e,w} = 38\text{dB}$ trickle Vent for Front Bedrooms: Simon Acoustic EHAS

For other areas that require no more than $D_{n,e,w} = 29\text{dB}$ standard ventilators should be acceptable (based on Velfac standard vent that achieves $D_{n,e,w} = 29\text{dB}$).

5.6 Conclusion

Noise levels have been measured where the proposed development will be built.

Noise levels created by the B2259 road have been assessed. The noise source has been added to a noise model which predicts the noise levels that will affect the development.

If the developer implements the mitigation measures detailed in this report it is considered that the pre-commencement planning conditions will be satisfied.

6 Appendix

6.1 Noise Models and Survey Location

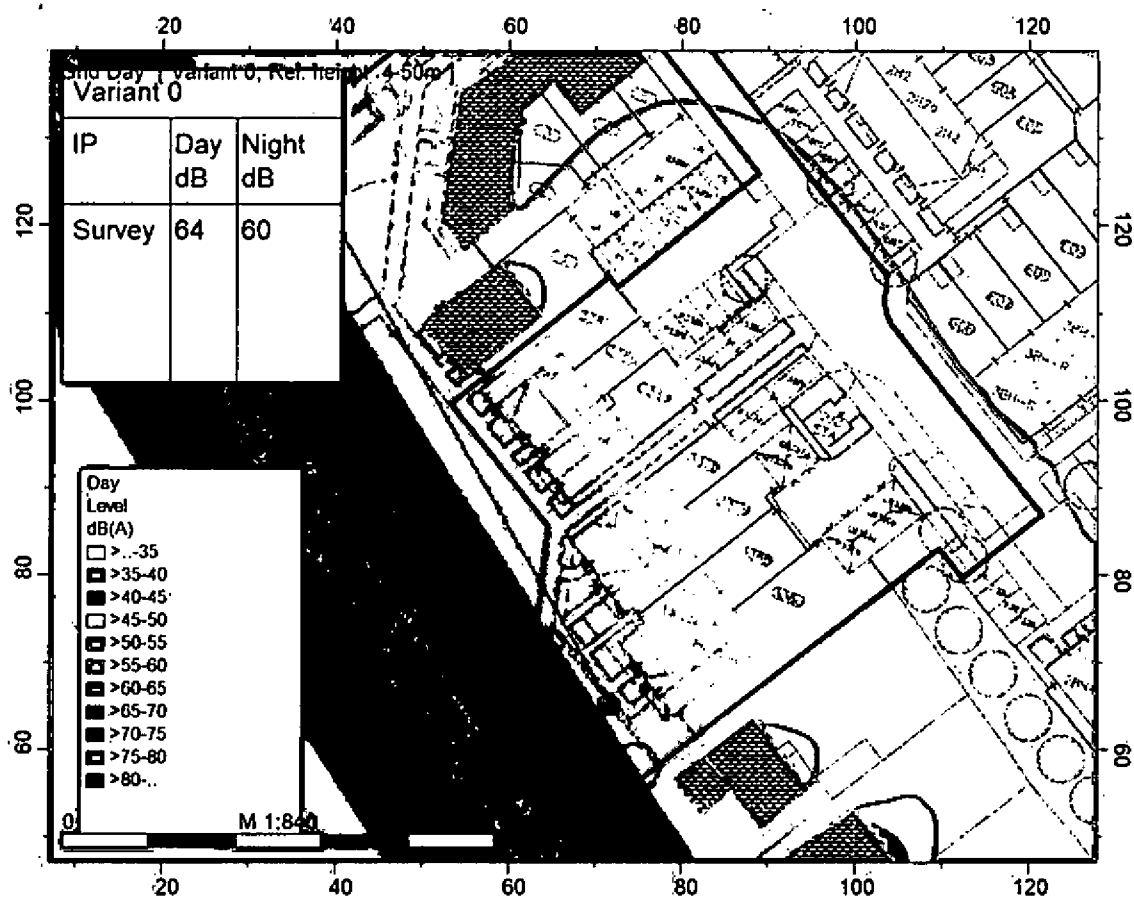


Figure 2: Survey Noise Model

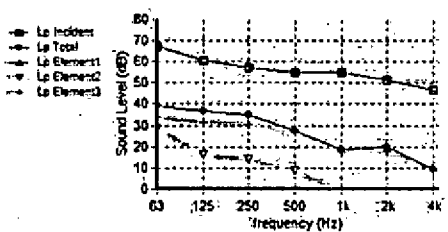
6.2 Building Envelope Sound Reduction Calculations

Outdoor To Indoor Sound Transmission Calculation (v8.0.0)

According to EN12354/3

Title:

Comments:



Date: 17 Feb 20

Initials: George Orton

File Name: Calculation

	Octave Band Centre Frequency (Hz)							Overall dBA
Source	63	125	250	500	1k	2k	4k	
Incident sound level (freefield)	67	61	57	55	55	52	47	59
Path								
Bement 1 ,Glass STL	-27	-23	-21	-33	-39	-34	-41	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [2.3 m2]	4	4	4	4	4	4	4	
Bement sound level contribution	37	35	34	19	13	15	3.1	27
Bement 2 ,wall STL	-41	-47	-46	-49	-59	-69	-78	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [8.0 m2]	9	9	9	9	9	9	9	
Element sound level contribution	29	17	14	8.7	-1.5	-15	-29	10
Bement 3 ,Vent STL	-40	-36	-34	-35	-44	-40	-45	
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [20 m2]	13	13	13	13	13	13	13	
Bement sound level contribution	34	32	30	27	17	18	8.5	27
Receiver								
Room volume (-10Log V) [26 m3]	-14	-14	-14	-14	-14	-14	-14	
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10Log T)	-3	-3	-3	-3	-3	-3	-3	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	39	37	35	27	19	20	9.6	30

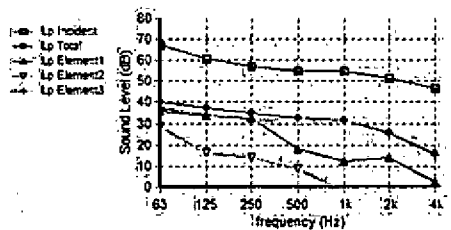
Figure 3: Bedroom BS12354 Calculation

Outdoor To Indoor Sound Transmission Calculation (v8.0.0)

According to BS12354/3

Title :

Comments :



Date: 17 Feb 20

Initials: George Orton

File Name: Calculation

Octave Band Centre Frequency (Hz)								Overall dBA
Source	63	125	250	500	1k	2k	4k	
Incident sound level (freefield)	67	61	57	55	55	52	47	59
Path								
Element 1 ,Glass STL	-27	-23	-21	-33	-39	-34	-41	26
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [3.0 m2]	5	5	5	5	5	5	5	
Element sound level contribution	36	34	33	18	12	14	2.1	
Element 2 ,wall STL	-41	-47	-46	-49	-59	-69	-79	10
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [10 m2]	10	10	10	10	10	10	10	
Element sound level contribution	29	17	14	8.7	-1.5	-15	-29	
Element 3 ,Vent STL	-34	-31	-31	-27	-28	-31	-36	35
Facade Shape Level diff.	0	0	0	0	0	0	0	
Area (+10Log A) [20 m2]	13	13	13	13	13	13	13	
Element sound level contribution	37	34	31	32	31	25	15	
Receiver								
Room volume (-10Log V) [43 m3]	-16	-16	-16	-16	-16	-16	-16	35
Reverberation time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
RT (+10Log T)	-3	-3	-3	-3	-3	-3	-3	
Equation Constant	11	11	11	11	11	11	11	
Room sound level	40	37	35	33	31	25	15	

Figure 4: Dining Room BS12354 Calculation