



Document reference: AC20099.01.00

400 Thames Vally Park Class AA

Noise Impact Assessment



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ii. Document History

Document Ref	Rev	Description	Date	Created By	Authorised By
AC20099.01.00	0	Noise Impact Assessment	28/05/24	BG	DG
AC20099.01.01	1	Noise Impact Assessment	21/06/24	BG	DG

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iii. Credentials

Acoustic survey and assessments were undertaken by Ben Groves BSc (Hons) MSc MIOA. Ben has been involved with acoustic consultancy for over ten years, has a Masters degree in environmental acoustics, and is a corporate member of the Institute of Acoustics (MIOA).

The report was authorised by David Gnanaseharam BSc (Hons) MSc MIOA. David has been involved with acoustic consultancy for over fifteen years, has a Masters degree in Acoustics from the University of Surrey, and is a corporate member of the Institute of Acoustics (MIOA).

In addition, they are both fully accredited under the Sound Insulation Testing and Measurement Association (SITMA) scheme. SITMA is a professional association for the Acoustic Consultancy industry and operates a registered testers scheme providing 3rd party accreditation to testing companies, ensuring that all companies operate to a high standard.

SITMA also holds UKAS Accreditation to ISO 17024:2012.



1. Introduction

This noise impact assessment has been prepared by Trace Surveys on behalf of TVP Investments Limited ('the Applicant'), in support of a Prior Approval Application under Schedule 2, Part 20, Class AA (new dwellinghouses on detached buildings in commercial or mixed-use) of the General Permitted Development Order 2015 for a two-storey upwards extension providing 32 residential units on the 4th and 5th floor with associated plant and car and cycle parking ('the Proposed Development') at 400 Thames Valley Park Dr, Earley, Reading RG6 1PT ('the Site')."

In this report, external noise levels impinging upon The Property will be measured and used to assess the impact on prospective residents. These noise levels will be used to establish the need for acoustically rated façade elements and will dictate the requirement for mechanical ventilation in the event that passive systems may lead to excessive internal ambient noise levels, in accordance with national standards and local authority guidance.

2. Relevant Standards and Guidance

The primary standards used in the preparation of this document are as follows:

- British Standard (BS) 7445: 2003 *Part 1 Description and measurement of environmental noise. Guide to quantities and procedures*
- British Standard (BS) 8233:2014 *Guidance on sound insulation and noise reduction for buildings*
- Noise Policy Statement for England (NPSE)
- Professional Practice Guidance on Planning & Noise (ProPG)
- Wokingham Borough Local Development Framework: Adopted core strategy development plan document (January 2010).

3. Site Description

The Proposed Development is in the administrative region of Wokingham Borough Council. The Site lies within a commercial estate, and the area immediately around the Site comprises large office blocks. The local noise climate is low level but dominated by a light steady flow of motor vehicles driving through or into the estate, occasional train passbys, and pedestrian traffic.



4. Environmental Noise Survey

4.1. Survey Details

Attended acoustic surveys were carried out by Trace between 11:00 - 14:00 on 20 May 2024, and between 00:30 - 03:00 on 23 May 2024.

The purpose of the surveys was to establish the prevailing ambient and background sound levels surrounding the Site and impinging upon the façades of the proposed residential developments. The survey results will form the basis of assessments to determine the acoustic performance requirements for external façade building elements.

Weather conditions during the day survey were acceptable, being fair and dry. The wind speed varied during the survey but did not regularly exceed 5m/s.

The measurements were completed approximately 1.5m from the ground and in general accordance with BS 7445-2:2003 '*Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use*', under free-field conditions.

Daytime acoustic data at the monitoring location was captured during 3 consecutive 1-hour periods between 11:00 and 14:00. The equipment used during the survey is listed in Table 4.1 below.

Equipment	Model Name	Serial No.	Calibration Expiry Date
Sound Level Meter	Norsonic 131	1312729	18/11/2024
Microphone	GRAS 40AE	159619	18/11/2024
Preamplifier	Norsonic 1207	12151	18/11/2024
Calibrator	Rion NC-75	34935217	01/12/2024

Table 4.1 Equipment details

The sound level meter used during the survey complies with the Class 1 standard as required by BS EN 61672-1:2013 *Electroacoustics. Sound level meters. Specifications*.

The calibration of the noise measurement system was checked before the commencement of the survey using a Rion NC-75 Calibrator, which had been calibrated within the preceding twelve months. No significant drift in calibration levels occurred during the survey (<0.1 dB). The calibration chain is traceable via the United Kingdom Accreditation Service (UKAS).

4.2. Results

Measurements were completed at ground floor level on the west end of the south-facing façade. This location is expected to be representative of a worst-case scenario as it is situated close to Shepards House Lane. Data was captured during 3 consecutive 1-hour periods between 11:00 and 14:00, the



sound level meter was set up to capture consecutive 5-minute octave band L_{eq} , L_{Aeq} , $L_{A_{fmax}}$, L_{A10} and L_{A90} sound levels.

The period-averaged L_{Aeq} noise levels are presented below in Table 4.2. The L_{A90} background sound level has been derived considering the most commonly occurring 5-minute level within each measurement period, whilst the $L_{A_{fmax}}$ presented is the 90th percentile of measured $L_{A_{fmax,F,5min}}$ levels throughout each measurement period.

The results of the noise survey have been summarised below. The full set of measurement results are presented in Appendix A.

Measurement period	Measured sound levels			
	$L_{Aeq,1hr}$	$L_{A_{fmax},1hr}$	$L_{A10,1hr}$	$L_{A90,1hr}$
12:00 - 13:00	53	77	58	42
13:00 - 14:00	53	76	56	41
14:00 - 15:00	54	77	57	41
Average (3-hour)^[1]	53	77	57	41

Table 4.2: Summary of measurement results

[1] $L_{Aeq,1hr}$ sound levels have been logarithmically averaged while statistical metrics have been arithmetically averaged.

To establish the 16-hour daytime L_{Aeq} level at the façade of a typical property at The Proposed Development, daytime noise levels can be evaluated using the ‘shortened measurement method’ described in the Department of Transport document ‘Calculation of Road Traffic Noise’ (CRTN), 1988. The CRTN shortened measurement method involves taking traffic noise measurements over representative sampling periods within three consecutive hours between 10:00 and 17:00 hours. CRTN uses the L_{A10} indicator, which can be converted to the EU noise indicator $L_{Aeq,16}$ using the following formulae:

$$L_{A10,18hr} = L_{A10,3hr} - 1 \text{ dB (CRTN Correction)}$$

$$L_{Aeq,16hr} = L_{A10,18hr} - 2 \text{ dB (EU Noise Indicator Correction)}$$

Representative 3-hour L_{A10} sound levels at the monitoring location provide a level of 57 dB $L_{A10,3hr}$. This level will be used along with the equations above to establish a daytime sound level for the whole Site. The result of this calculation is shown in Table 4.3, below.



Measurement period	Calculated sound level
	$L_{Aeq,16hr}$
07:00 - 23:00	54

Table 4.3: Calculated $L_{Aeq,16hr}$ sound level

Night-time measurements have been completed between the hours of 00:00 and 03:00. Due to the stable nature of the measured noise level, it is expected that the 3-hour measurement will be representative of the whole 8-hour night period.

Measurement period	Measured sound levels			
	$L_{Aeq,3hr}$	$L_{Amax,3hr}$	$L_{A10,3hr}$	$L_{A90,3hr}$
00:00 - 03:00	49	70	45	39

Table 4.4: Summary of nighttime measurement results

Based on the measured $L_{Aeq, 5mins}$ noise levels, the calculated day-time $L_{Aeq, 16hr}$, and worst case night-time $L_{Aeq, 8hr}$ noise levels have been derived. The average daytime and night-time noise levels will be used to assess the sound insulation performance requirements for the external façade and to produce acoustic performance specifications. Table 4.5 below presents the octave band sound pressure level (63-8k Hz) noise data to be used in the assessment of the external noise intrusion into the proposed development.

Measurement period	Octave Band Centre Frequency (Hz)								dB	
	63	125	250	500	1k	2k	4k	8k	L_{Aeq}	L_{Amax}
Daytime $L_{Aeq, 16hrs}$ (07:00-23:00)	60	59	56	52	48	42	34	29	54	N/A
Night-time $L_{Aeq, 8hrs}$ (23:00-07:00)	59	53	47	45	46	41	34	24	49	70

Table 4.5: Noise data to be used in façade sound insulation assessments (whole Site)

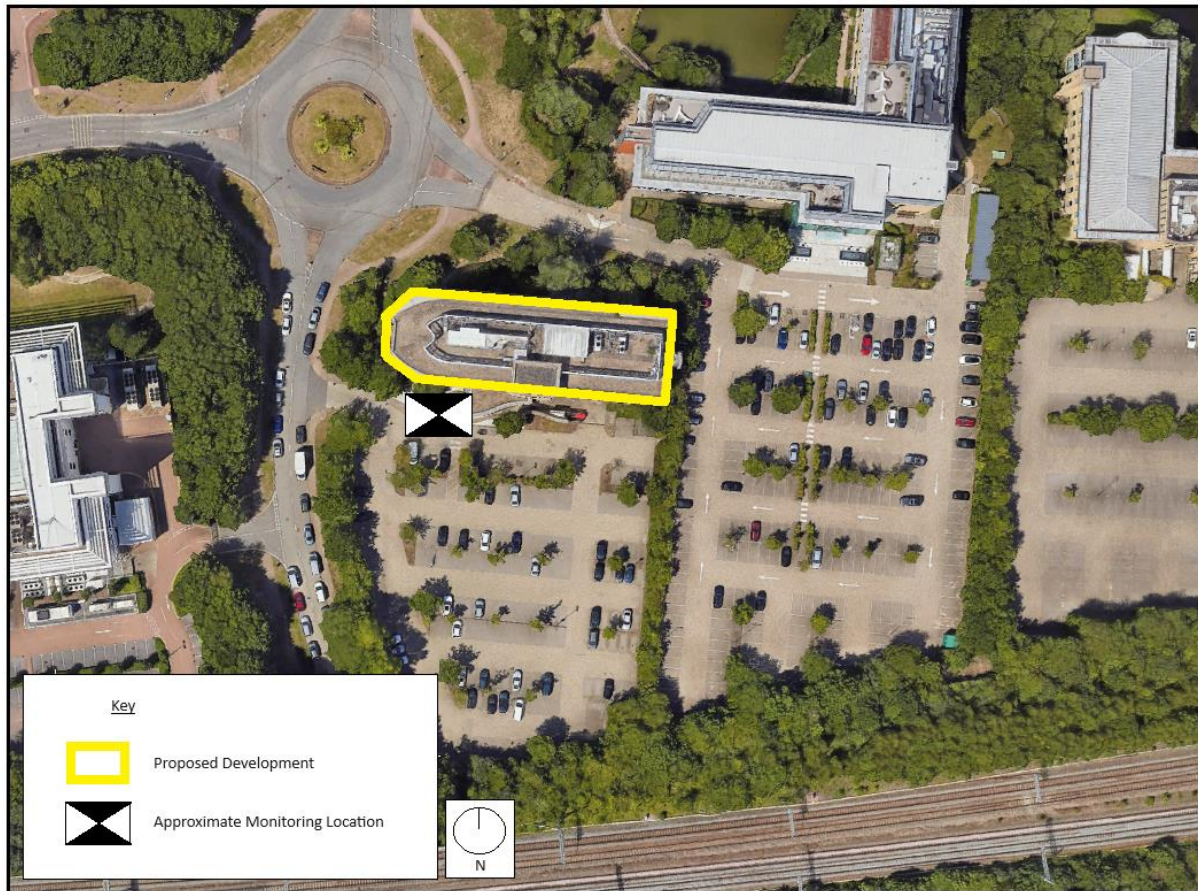


Figure 4.1: Site Location and Monitoring Location



5. Project criteria

5.1. External Façade Requirements

British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings* (BS8233:2014) provides guidance on the acceptable levels of noise within buildings of different types, these levels are based on World Health Organisation (WHO) guidelines.

In the case of residential developments, BS 8233:2014 recommends ambient noise levels in living accommodations. The document states that *“in general, for steady external noise sources, the internal ambient noise level shouldn't exceed the guideline values...”* recommendations from BS8233 are reproduced in Table 5.1 below.

Activity	Location	Day-time 07:00-23:00	Night-time 23:00-07:00
Resting	Living room	35 dB L _{Aeq} , 16hour	-
Dining	Dining room/area	40 dB L _{Aeq} , 16hour	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq} , 16hour	30 dB L _{Aeq} , 8hour

Table 5.1 Indoor ambient noise levels for dwellings

A specific maximum L_{AFmax} value is not given by BS 8233:2014. Based on commonly applied criteria, we propose that for bedrooms at night, individual noise events should not normally exceed 45 dB L_{AFmax}.

6. External Façade Assessments

6.1. External Noise Levels – Level 1 Assessment

This section provides an assessment of the suitability of the Site for residential use with respect to noise.

The Association of Noise Consultants and the Institute of Acoustics have produced a residential design guide relating to acoustics ventilation and overheating. To complete an initial site risk assessment, externally measured free field sound levels can be assessed using Figure 6.1.

Risk Category for level 1 assessment		Potential effect without mitigation		Recommendations for further assessments
Day-Time L_{Aeq,16hr} (07:00-23:00)		Night-time L_{Aeq,8hr} (23:00-07:00)	 Increasing risk of adverse effect	Recommended
65dB		55dB		Optional
60dB		50dB		
55dB		The use of openable windows as primary means for mitigating overheating is not likely to cause		Not required
50dB				
		45dB		

Figure 6.1 Guidance for level 1 site risk assessment



Based on the measured sound levels presented in Section 3 a level 1 risk assessment can be completed. It can be seen that noise levels impinging on the façade of the proposed development present a **low risk of noise having an adverse effect**.

6.2. Façade (and Glazing) specification

Using the façade noise levels, presented in Table 4.5, calculations have been completed to allow the selection of both glazing and ventilation for the whole development. The calculations consider the free-field equivalent sound level, the sound reduction index of the glazing and ventilation elements, the sound reduction of the façade, and the internal acoustics of a typical domestic room. Based on these calculations in Appendix B of this report, façade elements and ventilation can be specified.

It is assumed that the non-glazed areas of any façade systems may incorporate sufficient acoustic treatment such that the glazing remains the weakest path for external noise intrusion. As such, the acoustic performance of the glazing will be the most critical element in determining the overall sound insulation performance of the external façade.

Table 6.1 presents the sound insulation performance specifications recommended for elements of the external building fabric system for all rooms. Typical constructions that achieve the internal ambient noise criteria in BS8233:2014 are also provided. Full calculations can be seen in Appendix B.

Façade Element	Living rooms and Bedrooms	
	Sound Insulation Performance, dB R _w	Example Constructions
External wall Fabric	50	Brick and block external wall (BS8233 - 2014)
Glazing	32	6/6/4 Glazing Pilkington

These values have been based on:

Ventilation – Vent: "hit and miss" trickle (4000mm²)

Living room - 100m³ room volume with 15m² external façade and a 1.5m² window.

Calculations were carried out using a reverberation time (RT60) of 0.5 seconds across all frequency bands.

Table 6.1 Building envelope proposed construction – Broadwater Façade Façade

As seen from Table 6.1, to meet the requirements of BS8233:2014, glazing system with an acoustic rating of 32 dB R_w, an example system would be a 6/6/4 Pilkington Glazing system.

The ventilation requirements of Approved Document F may be satisfied by the use of standard 4000mm² "hit and miss" trickle vents.

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7. Conclusions

Trace have been appointed to provide acoustic consultancy services in support of a Prior Approval Application under Schedule 2, Part 20, Class AA issued to the Wokingham Borough Council for the proposed development occurring at 400 Thames Vally Park.

Planning permission is being sought from Wokingham Borough Council to redevelop the existing 4-storey office building. The proposed scheme will seek to provide a two-storey upward extension to the existing commercial building to provide 32 residential units on the 4th and 5th floor with associated plant and car and cycle parking. Further, an application will be made for a change of use of the ground, 1st, 2nd, and 3rd floors (use Class E) to 62 residential dwellings (use Class C3).

Attended acoustic surveys were carried out by Trace between 11:00 - 14:00 on 20 May 2024 and between 00:30 - 03:00 on 23 May 2024. Summary of the results can be seen in Section 4.2.

Based on the measured sound levels presented in Section 3 a level 1 risk assessment can be completed. It can be seen that noise levels impinging on the façade of the proposed development present a **low risk of noise having an adverse effect**.

As seen from Table 6.1, to meet the requirements of BS8233:2014, glazing system with an acoustic rating of 32 dB Rw, an example system would be a 6/6/4 Pilkington Glazing system. The ventilation requirements of Approved Document F may be satisfied by the use of standard 4000mm² "hit and miss" trickle vents.

Following the advice provided in this report, it is anticipated that the proposed development will meet Wokingham Borough Council's requirements for internal noise levels from external sources, in accordance with BS8233:2014 and relevant British Standards.

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Appendix A Figures

Time Stamp	LAeq	LAFmax	LAF,Perc4	LAF,Perc6	Lfreq	8.0 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz	16.0 kHz
11:25	54.4	65.1	57.1	47.2	58	61.9	71.8	61.8	58.3	54.3	51	49.5	46.3	41.2	35.8	29.8	
11:30	54.3	76	57.9	41	61.4	65.7	65.1	62.5	58.5	53.1	51	49.4	46.5	40.1	33	27.5	
11:35		69.7	67.5	41	59.3	63.2	66.1	65.4	62.5	54.9	58.9	57	49.2	40.4	27.8	23.8	
11:40	52.5	67.1	55.9	42.3	58	60.5	64.2	60.2	55.5	52.2	48.4	47.1	46	36.9	30.7	34.5	
11:45	51.1	74.8	55.3	40	56.3	61.2	65.5	63.7	54.9	53	47.9	45.2	42.1	38.4	33.6	33.6	
11:50	50.1	62.6	51.9	41.9	55.7	59.2	62.6	59.8	53.5	49.5	44.7	44.3	44	39	28.5	31.3	
11:55	55.2	78	58.8	42.2	58.2	64.8	71.1	68.9	61.4	54.7	50.3	49.3	47.7	43.7	37	35.9	
	53	77	58	42													
12:00	52.8	65	56.3	41.4	57.1	63.2	66.7	64.8	57.3	52.3	48.6	47.8	44.9	39.4	32.6	36.2	
12:05	54.3	75.5	57.3	42	57.7	63.5	65.6	64.9	57.2	52.5	49.8	49.4	47.2	41.8	36.4	37.1	
12:10	51.2	65.9	54.6	41	55.9	60.6	64.6	60.8	55	54.5	47.6	45.7	42.3	34.8	28.9	36	
12:15	51.6	64.5	55.5	39.2	54.5	59.7	64	73.9	57.9	52.4	47.1	43.9	41	33.3	28.1	35.3	
12:20	49	61.9	53.6	40	55	60.7	63.3	57.3	51.3	47.1	44	44.7	41.7	37.4	30.3	35.6	
12:30	48.9	61	53.3	40.8	58.8	60.4	63.1	58	52.6	50.7	45.8	43.3	40.2	34.6	28.3	35.3	
12:35	58.9	76.5	62.7	40.1	62.4	65	67.2	65.1	63.7	56.7	57	54.6	49.3	40.7	33.7	35.3	
12:40	50.6	65.4	54.3	43.2	56.4	59.7	64.8	60.8	56.1	48.8	46	45.6	43.2	38.5	31.5	35.2	
12:45	46.5	61.8	50	39.6	55.9	60.3	64	55.1	52.5	49.4	43.1	39.2	34.9	36.2	30.1	35.5	
12:50	53.9	66.4	58.6	39	60.2	63	64.9	59.6	58.9	56.3	52.4	48.2	42.2	34.4	29.1	35.7	
	53	76	56	41													
13:15	53.5	72.7	57.6	39.6	57.6	59.7	62.7	59.2	52.9	50.4	49.8	49.1	45.8	42.5	38.8	34.4	
13:20	59.2	69.8	65.6	40.2	60.1	61.4	64.2	62.4	57	55.2	57.3	56	49	39.5	31.3	34	
13:25	52.3	76.8	55	41.9	59	61.7	64	59.1	56	51.2	49.1	47.2	43.4	41	37.6	35.8	
13:30	54	77.7	57.6	41.2	59.6	61.1	63.3	60.6	53.4	51.4	48.4	49.5	46.9	43.4	38.5	36	
13:35	50.9	63.3	54.3	41.7	57.8	60	63	59.9	55.7	50.5	47	47.1	41.2	37.8	30	34.2	
13:45	50	63.5	53.7	41.6	58.9	60.1	62.9	60.7	55.1	48.8	45.2	45.4	42.6	36.6	31.1	34.6	
13:50	53.2	73.2	56	40.8	59.7	61.1	63.1	60.6	56.6	52.8	51.1	47.9	44.6	36.7	30.9	34.2	
13:55	54.5	73.4	57.9	44.4	58.7	61.3	63.7	60.7	55.2	52.6	53.8	48.8	45.1	38	33.6	34.4	
14:00	54	71	57.5	41.7	58	59.5	64.2	60.4	54.9	50.6	50	49.9	46.6	42	36.8	34.6	
	54	77	57	41													

Figure A.1 Daytime Survey Results

Time Stamp	LAeq	LAFmax	LA10	LA90	Lfreq	8.0 Hz	16 Hz	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz	16.0 kHz
00:00	50.3	69.8	43.7	40	55.5	53	58.5	54.2	46.4	44.2	48.1	43.8	40.6	43	38.3	33	
00:15	40.9	47.2	42.2	39.3	55.2	53.1	55.7	52.2	46.2	40.9	37.8	36.2	30.5	28.1	24.9	27.8	
00:30	55.1	73.3	50.1	40	59	57.4	63.6	62.5	55.7	52.4	51.9	51.7	46.9	35.5	22.8	29.4	
00:45	54.3	69.1	58.8	40.1	67.4	64.3	66.6	65.3	56.2	53.2	51.4	49.8	45.9	40.6	28.3	28.6	
01:00	48.2	68.2	44.5	38.9	61	57.1	61.3	58.4	51.8	45.8	44.1	44.7	39.7	32.9	23.4	28.6	
01:15	43.1	64.3	44.7	37.5	54.2	52.7	59.2	56.8	47.5	42.2	39.7	38	33.9	30.4	30.9	29.9	
01:30	40.7	61.4	42.5	37.9	55.3	53.5	60.5	60.5	50	40.6	36.7	33.7	30	26.4	20.3	27.9	
01:45	41.8	64.8	44	38.5	49.8	51.8	65.6	65.3	49.7	40.9	37.2	33.9	30.8	28.1	17.9	27.5	
02:00	42.4	59.9	43.9	38.6	55.8	53.2	59	57.1	47.3	42.8	39.3	37.8	32.1	25.3	18.2	26.1	
02:15	39.7	61.6	40.5	38.2	58.2	53.8	58	50.3	46.1	41.2	37.3	34.5	28.6	23.6	18.9	27.2	
02:30	47.3	68.3	41.3	38.8	52	53.6	59.6	55.1	47.7	43.1	42	44	40.6	28.2	18.4	27.2	
02:45	42	48	45	40.2	49.6	50.7	59.1	53.8	49.6	43.8	38.8	37.2	29.6	25.2	21.9	26.3	
	49	70	45	39													

Figure A.2 Nighttime Survey Results

Appendix B Tables

Project	400 Thames Valley Park					Date	28-May-2024
Façade	All					By	BG
Room	All					Checked	DG
Symbol	Description	Ref	Units	Single Figure Rating			
S_f	Total façade area of room		m ²	15.0			
S_{wi}	Area of windows in façade		m ²	3.0			
S_{ew}	Area of external wall in façade		m ²	12.0			
S_{ce}	Area of ceiling exposed to external noise		m ²	0.0			
S	Total area of elements through which sound enters room		m ²	15.0			
A_0	Reference absorption area given in BS EN 20140-10		m ²	10.0			
	A-weighted free-field equivalent sound pressure level at measurement position		dB				
	Total propagation and angle of view correction from measurement to façade		dB	0.0			
$L_{Aq,ff}$	A-weighted free-field equivalent sound pressure level outside façade		dB	54.0			
$L_{TRAFFIC}$	Normalised road traffic noise spectrum derived from BS1793-3		dB				
$L_{eq,ff}$	Linear free-field equivalent sound pressure level outside façade		dB	61.6	59	56	52
D_{ne}	Vent: "hit and miss" trickle (4000mm2)	80	dB		34	27	37
R_{wi}	Sound reduction index of windows - 6/6/4 Glazing Pilkington	111	dB		21	20	26
R_{ew}	Sound reduction index of the external wall - Brick and block external wall (BS829)	9	dB		40	44	45
R_{ce}	Sound reduction index of the roof/ceiling	94	dB		28	34	40
α	Room average alpha co-efficients (acoustically hard room)	-					
S_{room}	Room surface area		m2				
A	Equivalent absorption area of room		m ²		9	9	9
$L_{eq,2}$	Linear Internal reverberant sound pressure level in room		dB	39.9	37	36	25
	A-weighting Network				-16	-9	-3
$L_{eq,3}$	A-weighted internal reverberant sound pressure level in room		dB(A)	29.6	21.0	27.4	22.3
	Internal Criteria		dB(A)	35.0			
	Excess over criteria		dB(A)				

Table B.1 Daytime internal ambient sound levels

Project	400 Thames Valley Park					Date	28-May-2024
Façade	All					By	BG
Room	All					Checked	DG
Symbol	Description	Ref	Units	Single Figure Rating			
S_f	Total façade area of room		m ²	12.0			
S_{wi}	Area of windows in façade		m ²	4.0			
S_{ew}	Area of external wall in façade		m ²	8.0			
S_{ce}	Area of ceiling exposed to external noise		m ²	0.0			
S	Total area of elements through which sound enters room		m ²	12.0			
A_0	Reference absorption area given in BS EN 20140-10		m ²	10.0			
	A-weighted free-field equivalent sound pressure level at measurement position		dB				
	Total propagation and angle of view correction from measurement to façade		dB	0.0			
$L_{Aq,ff}$	A-weighted free-field equivalent sound pressure level outside façade		dB	49.0			
$L_{TRAFFIC}$	Normalised road traffic noise spectrum derived from BS1793-3		dB				
$L_{eq,ff}$	Linear free-field equivalent sound pressure level outside façade		dB	55.0	53	47	45
D_{ne}	Vent: "hit and miss" trickle (4000mm2)	80	dB		34	27	37
R_{wi}	Sound reduction index of windows - 6/6/4 Glazing Pilkington	111	dB		21	20	26
R_{ew}	Sound reduction index of the external wall - Brick and block external wall (BS829)	9	dB		40	44	45
R_{ce}	Sound reduction index of the roof/ceiling	94	dB		28	34	40
α	Room average alpha co-efficients (acoustically hard room)	-					
S_{room}	Room surface area		m2				
A	Equivalent absorption area of room		m ²		9	9	9
$L_{eq,2}$	Linear Internal reverberant sound pressure level in room		dB	33.8	32	28	19
	A-weighting Network				-16	-9	-3
$L_{eq,3}$	A-weighted internal reverberant sound pressure level in room		dB(A)	23.3	16.0	19.2	16.3
	Internal Criteria		dB(A)	30.0			
	Excess over criteria		dB(A)				

Table B.2 Nighttime internal ambient sound levels



Project	400 Thames Valley Park					Date	28-May-2024
Façade	All					By	BG
Room	All					Checked	DG
Symbol	Description	Ref	Units	Single Figure Rating			
S_f	Total façade area of room		m ²	12.0			
S_{wi}	Area of windows in façade		m ²	4.0			
S_{ew}	Area of external wall in façade		m ²	8.0			
S_{tr}	Area of ceiling exposed to external noise		m ²	0.0			
S	Total area of elements through which sound enters room		m ²	12.0			
A_0	Reference absorption area given in BS EN 20140-10		m ²	10.0			
	A-weighted free-field equivalent sound pressure level at measurement position		dB				
	Total propagation and angle of view correction from measurement to façade		dB	0.0	Octave Band Centre Frequency, Hz		
$L_{Aeq,ff}$	A-weighted free-field equivalent sound pressure level outside façade		dB	70.0	125	250	500
$L_{TRAFFIC}$	Normalised road traffic noise spectrum derived from BS1793-3		dB		1000	2000	
$L_{eq,ff}$	Linear free-field equivalent sound pressure level outside façade		dB	76.2	74	68	66
$D_{n,e}$	Vent "hit and miss" trickle (4000mm2)	80	dB		67	62	
R_{wi}	Sound reduction index of windows - 6/6/4 Glazing Pilkington	111	dB		34	27	37
R_{ew}	Sound reduction index of the external wall - Brick and block external wall (BS829		dB		35	35	34
R_{tr}	Sound reduction index of the roof/ceiling	94	dB		21	20	26
α	Room average alpha co-efficients (acoustically hard room)		-		38	38	37
S_{room}	Room surface area		m ²		40	44	45
A	Equivalent absorption area of room		m ²		51	51	56
$L_{eq,2}$	Linear Internal reverberant sound pressure level in room		dB	54.8	28	34	40
	A-weighting Network				45	49	49
$L_{eq,3}$	A-weighted internal reverberant sound pressure level in room		dB(A)	44.3	-16	-9	-3
	Internal Criteria		dB(A)	45.0	0	0	1
	Excess over criteria		dB(A)				

Table B.3 Nighttime internal L_{Amax} Levels