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AAD
applied
acoustic
design

PARK HOUSE, STATION ROAD

TEDDINGTON

ACOUSTIC ASSESSMENT

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1.0 Brief

1.1 Undertake a noise level survey at the site of the proposed development at Park House, Teddington, in order to establish the current road traffic noise levels at and around the site.

1.2 Evaluate the typical daytime and night-time noise levels incident upon the site. Assess the noise levels with regards to PPG24.

1.3 Suggest suitable internal room noise level criteria having regard to the guidance in BS 8233:1999, and evaluate existing building fabric against these criteria consequent upon the external road traffic noise levels.

1.4 Issue a summary report including all data and assessments, suitable for issue to the local planning authority as part of a planning application.

2.0 Site Description

2.1 The development at Park House is bounded by Broad Street/ High Street to the north, Station Road to the east and Teddington Business Park to the south and west. The site is also adjacent to a three storey commercial building to the West which overlooks a railway line. See Appendix A for a site plan.

2.2 The proposed development is four storeys in height with a restaurant on the ground floor and three floors of residential above.

2.3 Park House is located at the edge of a commercial area with residential properties to the east of the site. See Appendix A for a site plan.

3.0 Survey Details

3.1 Location: Automated measurements were undertaken on the rooftop of the existing building currently being occupied as a recording studio. This location corresponds to the front window of Bedroom 1 on the third floor in the proposed development. See Appendix A for the measurement location.

3.2 Instrumentation: Measurements were conducted using a Larson Davis type 831 (Serial No. 002009) environmental sound level meter equipped with a Larson Davis pre-amplifier and ½" microphone. The instrument was calibrated prior and subsequent to use, with a calibration drift recorded within 0.1 dB.

3.3 Period: Automated monitoring was conducted in 15-minute intervals between approximately 17:00 on Friday 15th April 2011 and 16:00 on Tuesday 19th April 2011. In addition to this L_{Amax} 1-minute intervals were also measured over the same time period.

3.4 Weather: The prevailing weather conditions over the survey periods were dry and clear. Wind speed, although not recorded, was considered to be less than 5 m/s throughout the survey period.

3.5 Site Noise Characteristics: The noise climate at the north east corner was dominated by Broad Street and High Street traffic noise. The noise climate at the west facade was dominated by Broad Street and Park Road traffic noise and train pass-bys.

3.6 Surveyor: Alex Polegaj BEng (Hons) BSc

3.7 See Appendix F for glossary of terms

4.0 Assessment Criteria

4.1 Criteria for acceptable internal noise levels due to external noise intrusion are provided in BS 8233: 1999. Of relevance are the following:

Table 1 – BS8233 Criteria

Criterion	Typical Situations	Design Range, $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable resting/ sleeping conditions	Living rooms	30	40
	Bedrooms	30	35

4.2 The appropriate time period, T, is determined with reference to PPG 24 (Planning and Noise), which suggests the use of daytime and night-time periods, i.e.;

Daytime: 07:00 to 23:00
Night-time: 23:00 to 07:00

4.3 The criteria for living rooms should be based upon the daytime period ($L_{Aeq,\ 16hr}$), whilst bedrooms should be based upon the night-time period ($L_{Aeq,\ 8hr}$).

4.4 In addition to achieving the L_{Aeq} (or average) noise criteria, BS8233: 1999 also states that in bedrooms at night, individual noise events (measured with a fast time-weighting) should not normally exceed 45 dB L_{Amax}.

4.5 The relevant criteria for internal ambient noise intrusion can be summarised as follows:

Table 2 – Proposed Design Criteria

Room Type	Period	Index	Criteria
Living Rooms	Day (07:00 to 23:00)	$L_{Aeq,16hr}$	40 dB
Bedrooms	Night (23:00 to 07:00)	$L_{Aeq,8hr}$ L_{Amax}	35 dB 45 dB

5.0 Noise Survey Results

5.1 The automated measurement data has been processed and logarithmically averaged to provide daytime (16-hour) and night-time (8-hour) L_{Aeq} values for the measurement location.

5.2 The site noise environment is dominated by road traffic along High Street and at the intersection with Station Road. The rail service to the west of the proposed development was observed to have negligible impact on the noise environment during morning and afternoon visits on the 15th, 18th, and 19th of April.

5.3 The measured external noise levels at the site are summarised as follows:

Table 3 – Average Measured External Site Noise Levels

Traffic Noise Levels		
Daytime	**Night-time**	**Night-time, typical $L_{Amax, slow}$**
$L_{Aeq,16hr}$ 67 dB	$L_{Aeq,8hr}$ 59 dB	$L_{Amax, slow}$ 74 dB

Note: L_{Aeq} have a +3dB correction and L_{Amax} has a +6dB correction for the difference in distance to the noise source of the measurement location and the closest receiver location taken from the site layout plan.

5.4 It is expected that the influence of noise from the railway on the noise environment will continue to be negligible throughout the night period due to the noise level difference between the day and night periods being less than 10dB and to the intermittent noise from the railway compared with the nearby road traffic. Appendix B provides a graphical representation of the measured data at the measurement location.

6.0 PPG 24 Site Classification

6.1 PPG 24 : Planning and Noise provides guidance regarding site noise exposure categories (NECs) based upon the values of daytime $L_{Aeq,16hr}$ and night-time $L_{Aeq,8hr}$, in accordance with the following:

Table 4 – PPG 24 Classification

NOISE LEVELS CORRESPONDING TO THE NOISE EXPOSURE CATEGORIES FOR NEW DWELLINGS $L_{Aeq, T}$				
	NOISE EXPOSURE CATEGORIES			
Traffic noise	**A**	**B**	**C**	**D**
07:00 – 23:00	< 55	55 – 63	63 – 72	> 72
23:00 – 07:00	< 45	45 – 57	57 – 66	> 66

6.2 PPG 24 further states for the nighttime noise levels (23.00 – 07.00): Sites where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq, 8h}$ (except where the $L_{Aeq, 8h}$ already puts the site in NEC D).

6.3 The results of the measurement data as shown in Table 3 indicate that the site classifications are as follows:

Table 5 – Noise exposure Category

Location	**Noise Exposure Category**	
	Daytime 07:00 -23:00	**Night-time 23:00 – 07:00**
Park House	C	C

6.4 The advice in PPG24 for sites in NEC C categories are as follows;

NEC C *"Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise"*

6.5 It is considered that, provided it can be shown that internal noise levels can be within the limits set out in BS 8233 (see below), there is no reason not to grant planning permission for the development.

7.0 BS 8233 Assessment

7.1 Table 6 below provides the results of octave band measurements from the automated noise monitor position.

Table 6 – Design Noise Levels

Period	octave band centre frequency (Hz)							dBA
	63	125	250	500	1k	2k	4k	
	sound pressure level, dB re $2x10^{-5}$ Pa							
Daytime, $L_{eq,16\ hr}$	74	68	66	63	63	59	51	67
Night-time, $L_{eq,8hr}$	67	60	59	55	55	51	44	59
Night $L_{Amax,F}$	85	79	75	70	68	66	58	74

Note. L_{Amax} noise levels are taken as those that are "not normally exceeded", taken to be less than four events in any one hour.

7.2 Daytime internal noise levels have been calculated for within the living areas of the proposed development, with night time internal noise levels being calculated for the main bedroom. The approximate dimensions for each space is 10m (length) x 6.5m (width) x 3.0m (height) for bedrooms and 13m (length) x 6.5m (width) x 3.0m (height) for living areas

7.3 It is understood the proposed building façade is to be a flat composite cladding with a single window and glass door to both the bedroom and living areas. The total glazing area of each room is approximately 3.5m x 1.8m. Glazing is assumed to be typical aluminium framed (or equivalent) with sealed double glazed units and frame trickle vents (assumed one per room). Calculations have been performed to determine the minimum sound insulation performance of windows and trickle vents, in order to achieve the required internal noise levels as set out in table 2, when windows and doors are closed and vents are open. This has been based upon the external noise levels set out in table 6, accounting for the performance of the façade as set out above, and taking into account the relative rooms sizes and window areas. The minimum requirements are as follows;

Table 7 – Glazing and Ventilation Specification

Windows		Vents	
Sound Insulation	**Type**	**Sound Insulation**	**Type**
31 dB R_w	4 - 12 - 4 glazing	30 dB $D_{n,e,w}$	Standard trickle vent (non-acoustic)

7.4 It has been assumed the cladding will have a minimum sound insulation performance of R_w 45 dB. Acoustic specifications for the cladding system are attached in Appendix D.

7.5 An acoustic performance specification for windows is provided in Appendix E. Note this performance applies to the entire window assembly, including frame, glazing and opening lights.

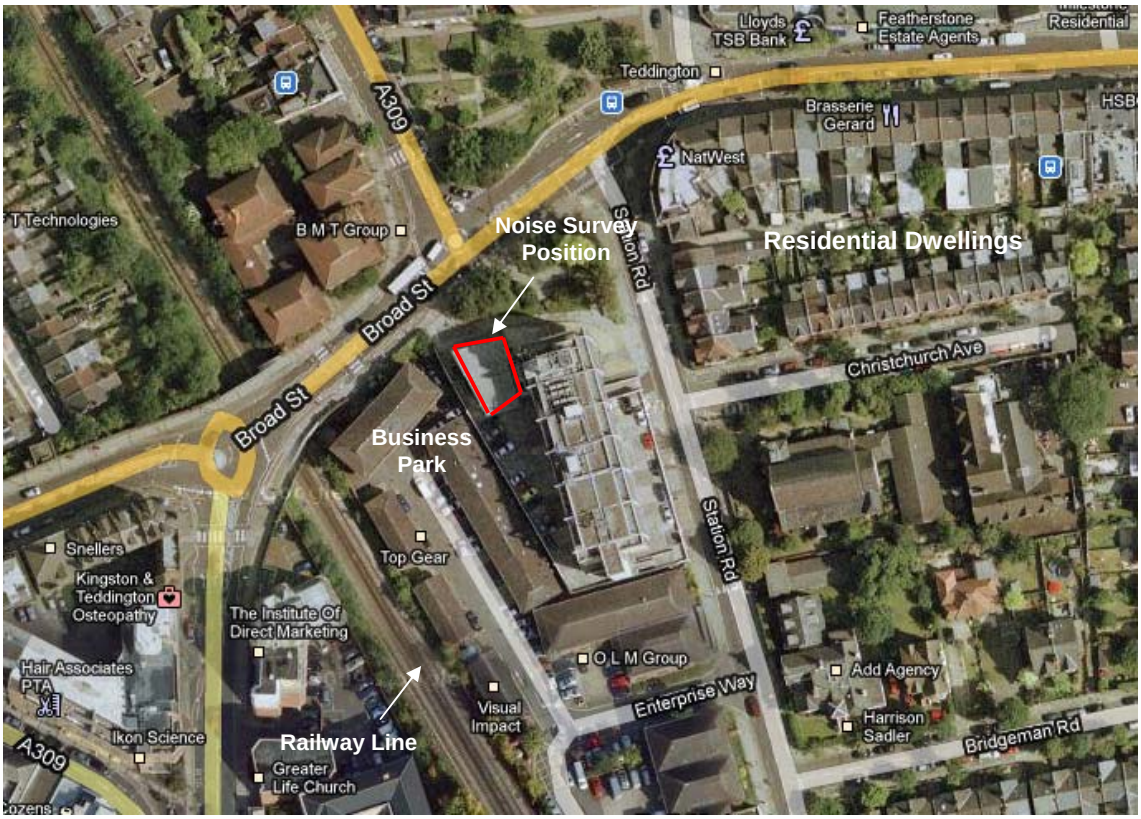
8.0 Conclusion

8.1 A noise survey study of the proposed development site at Park House, Station Road, Teddington has been conducted in order to establish the current noise levels at and around the site.

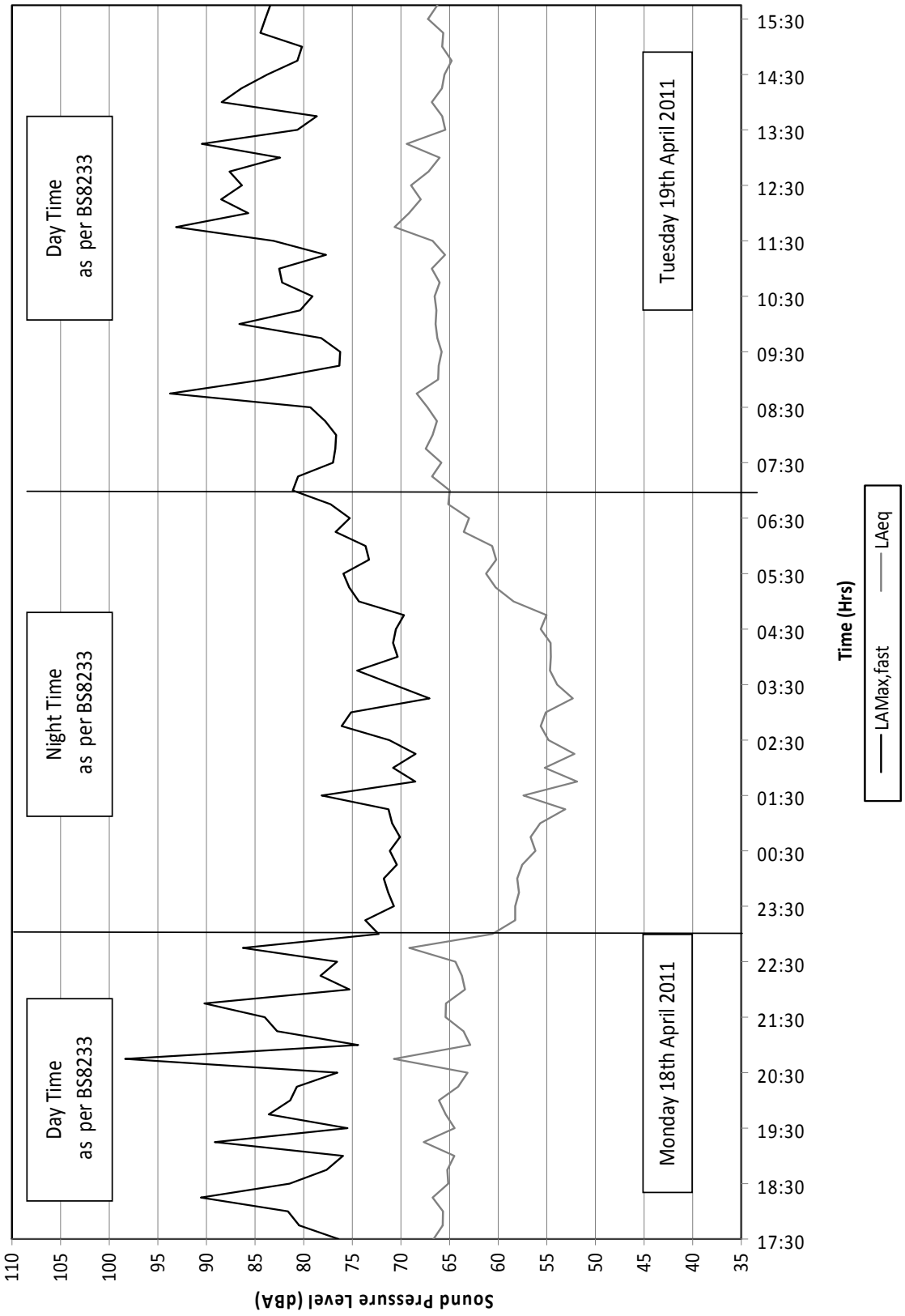
8.2 An evaluation of the typical external daytime and night-time noise levels at the existing site has been carried out by assessing the levels against the PPG24. Based on the measured noise levels it is calculated that the proposed development site will be in NEC C with respect to the guidance of PPG24.

8.3 An evaluation of the typical internal daytime and night-time noise levels inside the existing building has been carried out in relation to guidance provided by BS 8233. Minimum glazing and cladding acoustic specifications are provided for the proposed development in order to achieve the recommended internal nose levels.

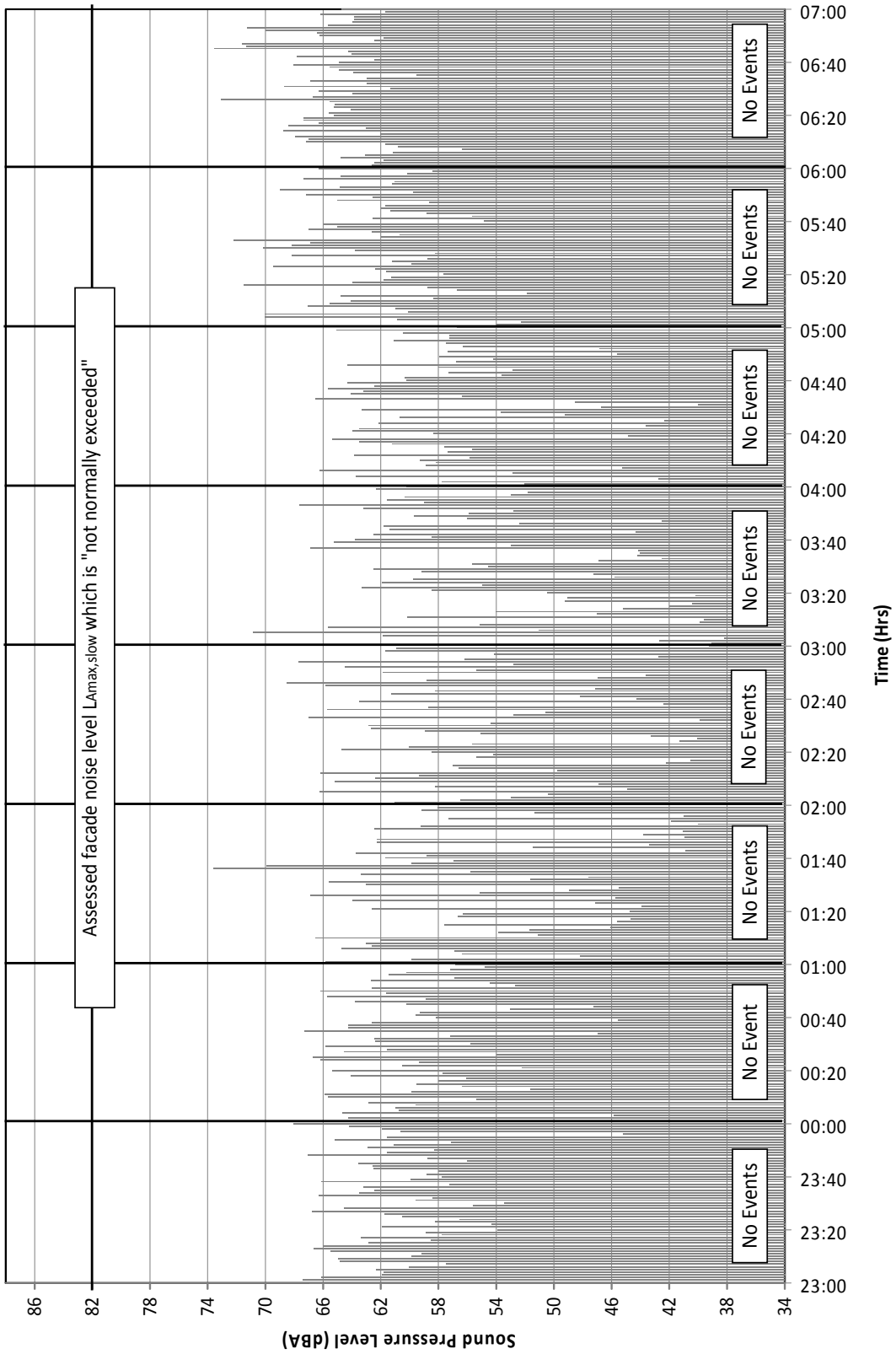
Appendix A: Measurement site plan



Appendix B: Noise Level Time History



Appendix C: $L_{Amax,slow}$ Event Time History



Appendix D: Acoustic Specification for Cladding

1.0 Cladding, including, related framework, mullions, transoms and, where applicable, furniture, all as are intended to be included within any part of the building façade, shall provide an airborne sound insulation index rating of not less than R_w 45:

2.0 Performance shall be as measured in accordance with BS EN ISO 140-3:1995 and rated in accordance with BS EN ISO 717-1:1997, and evidence to this effect shall be published as part of the tender response.

3.0 Elements as described above shall further offer not less than the minimum airborne sound reduction index (R) when measured in accordance with BS EN ISO 140-3:1995 shown below:

Cladding Sound Reduction	**Octave band centre frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
	Sound reduction index (R), dB						
R'_w 45 dB	30	36	37	40	46	54	56

Appendix E: Acoustic Specification for Windows

1.0 Windows, including all glazed elements, fixed and openable sections, related framework, mullions, transoms and, where applicable, furniture, all as are intended to be included within any part of the building façade, shall provide an airborne sound insulation index rating of not less than the following:

Room Type	Façade	Glazing Sound Reduction
Bedroom	All	R_w 31dB

2.0 Performance shall be as measured in accordance with BS EN ISO 140-3:1995 and rated in accordance with BS EN ISO 717-1:1997, and evidence to this effect shall be published as part of the tender response.

3.0 Elements as described above shall further offer not less than the minimum airborne sound reduction index (R) when measured in accordance with BS EN ISO 140-3:1995 shown below:

Glazing Sound Reduction	Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
	Sound reduction index (R), dB						
R'_w 31 dB	20	24	20	25	35	38	35

Appendix F: Glossary of Terms

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (Lp) the reference quantity is $2x10^{-5}$ N/m^2. The sound pressure level existing when microphone measured pressure is $2x10^{-5}$ N/m^2 is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (Lp).
Frequency	Is related to sound pitch; frequency equals the ratio between velocity of sound and wavelength.
A weighting	Arithmetic corrections applied to values of Lp according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq, T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of Lp actually measured.
$L_{Aeq, T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of Lp actually measured.
$L_{n, T}$	Lp which was exceeded for n% of time, T.
$L_{An, T}$	Level in dBA, which was exceeded for n% of time, T.
$L_{max, T}$	The instantaneous maximum sound pressure level, which occurred during time, T.
$L_{Amax, T}$	The instantaneous maximum A weighted sound pressure level which occurred during time, T.
Background Noise Level	The value of $L_{A90, T}$, ref. BS4142:1997.
Traffic Noise Level	The value of $L_{A10, T}$.
Specific Noise Level	The value of $L_{Aeq, T}$ at the assessment position produced by the specific noise source, ref. BS4142:1997.
Rating Level	The specific noise level, corrected to account for any characteristic features of the noise, by adding a 5 dBA penalty for any tonal, impulsive or irregular qualities, ref. BS4142:1997.
Specific Noise Source	The noise source under consideration when assessing the likelihood of complaint.
Assessment Position	Unless otherwise noted, is a point at 1m from the façade of the nearest affected sensitive property.