

Consultants in Noise and Vibration

The Keen Partnership
The Courtyard
Edinburgh Road
Reading
RG30 2UA

Date: 06 January 2014

Our Reference: 13169-004

Dear Sirs,

RESIDENTIAL FLATS DEVELOPMENT AT 125 CHATHAM STREET, READING, BERKSHIRE RG1 7JG

READING BOROUGH COUNCIL PLANNING APPLICATION REFERENCE: 130842

Details of the supplementary noise surveys, assessment and scheme for mitigation measures specifically relating to noise associated with Face Bar potentially affecting the site is provided below.

1. Introduction

This supplementary noise report is to provide additional information in response to concerns of Reading Borough Council that previous noise surveys undertaken and results included within Philip Acoustics Ltd report reference 13169-002 dated October 2013 were potentially of times when Face Bar (at rear of the site) was not busy and/or was not contributing typical (high) noise levels. This supplementary report includes:

- Additional noise surveys carried out Friday 6th and Saturday 7th December 2013;
- Building envelope acoustic calculations using highest levels of the additional noise surveys;
- Details for recommended & upgraded noise mitigation measures;
- Discussion.

2. Noise Surveys

Additional manned noise surveys were carried out over the evenings of Friday 6th December 2013 and also Saturday 7th December 2013 to include opening times of Face Bar. The measurement position is indicated on the block plan layout drawing as Enclosure 1 and was to the rear of the site at location representative of outside nearest proposed residential windows to Face Bar. The position was 1.5m above ground level as 1m façade levels.

The weather included dry and light wind conditions during majority of the noise survey times. During Saturday 7th December 2013 there was light drizzle for the first 15 minutes of the survey however this did not affect the survey results.

Noise measurements were recorded in terms of 5 minute samples of L_{Aeq} and L_{Amax} values. Samples of octave band values were also obtained to provide frequency content information of noise levels to assist with acoustic calculations for noise mitigation measures. Details of the noise survey instrumentation used are provided as Enclosure 2. The sound level meters were calibrated before and after the survey measurements using the UKAS certified calibrator.

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Complete raw data façade level results of the noise surveys in terms of L_{Aeq} and $L_{A_{fmax}}$ values are provided in graphical format as Enclosure 3.

Results of the noise survey for Friday 6th December 2013 are broadly consistent with surveys previously undertaken and results included within Philip Acoustics Ltd report reference 13169-002 dated October 2013.

However, results of the survey for Saturday 7th December 2013 show noticeably higher noise levels associated with Face Bar affecting the site than for Friday 6th December 2013 and also for any of the previous surveys undertaken.

The higher noise levels for Saturday 7th December 2013 were observed to be due to increased customer activity and numbers (more occurrence of raised voices etc) and also due to increased music noise breakout from Face Bar (further comment on this is provided in item 5 Discussion).

3. Building Envelope Acoustic Calculations

Revised building envelope acoustic calculations are provided as Enclosure 4. These are for rooms to sample flat 4 at ground floor to rear of the site as being closest to Face Bar. The revised calculations cautiously and as “worse case” use the highest measured $L_{Aeq(1\text{ hr})}$ value of the Saturday noise survey for the living room and also for the bedroom. In addition, a revised calculation is also carried out using the typical highest measured $L_{A_{fmax}}$ value of the Saturday noise survey for the bedroom.

The calculations using these “worse case” highest measured values of the Saturday noise survey include music and customer activity (raised voices etc).

Note that because the higher noise levels for Saturday 7th December 2013 and as used in the calculations, were observed to be partly due to increased music noise breakout from Face Bar then the revised calculations now include consideration of noise within the 63Hz octave band to take account of low frequency (bass) content of music.

The calculations are based on recommendations for upgraded noise mitigation measures to the building envelope detailed in item 4 of this report including now with very high performance secondary glazing to all living rooms and bedrooms at rear of the development as well as mechanical background ventilation via apertures either at roof level or to the western (side) elevation of the building.

The calculations show that with the recommended mitigation measures, noise intrusion into rooms of the flats will comply with the “good” conditions limits for external noise intrusion as required by Reading Borough Council with a comfortable margin (6dBA for living rooms and 9dBA for bedrooms).

Because the Reading Borough Council noise requirements are of overall dBA values then these do not necessarily take sufficient account of possible low frequency (bass) music noise breakout from Face Bar potentially affecting the site. The revised building envelope acoustic calculations provided as Enclosure 4 therefore as well as including consideration of the 63Hz octave band also assess noise intrusion into rooms of the proposed development in terms of NR (Noise Rating curve) values.

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NR values specify maximum noise levels in individual octave bands and are often be a useful method to assess noise levels that might contain low frequency component noise contribution that might not otherwise be properly assessed or detected using noise requirements in terms of just overall dBA values.

Assessed in terms of NR values the calculations show the following based on the “worse case” highest measured values of the Saturday noise survey:

- Noise into living rooms <NR20 L_{Aeq} (1 hr);
- Noise into bedrooms <NR15 L_{Aeq} (1 hr);
- Noise into bedrooms <NR20 L_{Amax} .

These NR values represent very low (quiet) noise levels into residential properties and it is considered they provide additional comfort regarding the specified upgraded (higher performance) noise mitigation measures.

4. Scheme For Noise Mitigation Measures

The recommended scheme for mitigation measures to protect rooms of the development from noise associated with Face Bar is provided below. Because the noise survey for Saturday 7th December 2013 showed higher noise levels than previously measured then the scheme has been upgraded to now include that high performance secondary glazing be specified for all living rooms and bedrooms of flats to the rear elevation of the development (i.e. flats with rooms towards Face Bar).

4.1 External Walls

External walls of the conversion part are formed by existing cavity brick and block masonry structure, walls to the new roof extension are proposed to be formed by cavity block structure with an external render and internal plasterboard linings of typically 1 x layers 12.5mm SoundBloc (or equivalent) plasterboard.

Values in Table 1 show the expected sound insulation performance for these types of external wall. These wall constructions naturally provide a high level of sound insulation and will be more than adequate.

Description	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Existing external walls Sound Insulation Performance R (dB)	39	41	45	50	55	58	*60
Roof extension external walls Sound Insulation Performance R (dB)	42	44	48	53	57	*60	*60

* Note: SI values limited to upper values 60dB. Higher figures might be obtained at these frequencies but are not quoted.

Table 1: External wall sound insulation performance Sound Reduction Index R dB

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4.2 Glazing

Based on calculations using “worse case” highest measured values of the Saturday noise survey including music breakout and customer activity it is recommended that specification for all windows (including any glazed balcony doors) to living rooms and bedrooms of flats to the rear elevation (i.e. towards Face Bar) be upgraded to be very high performance secondary glazing.

Values in Table 2 show a recommended specification for the secondary glazing sound insulation performance. The specification is in terms of octave band performance; equivalent overall sound insulation performance is approximately $\geq R_w$ 47dB and represents extremely high sound insulation normally only specified for residential dwellings very close to high noise sources such as railway lines, busy dual carriageways/motorways or airport flight paths.

Description	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Secondary glazing Sound Insulation Performance R (dB)	27	29	35	45	50*	50*	50*

* Note: SI values limited to upper values 50dB. Higher figures might be available at these frequencies but are not required.

Table 2: Secondary glazing sound insulation performance Sound Reduction Index R dB

Typical secondary glazing would be to use a standard double glazed unit (nominally 4mm glass – air gap – 4mm glass) as the outer window then with large air gap to an inner secondary window of minimum 6 or 8mm single thickness laminated or toughened glass. The size of the gap between the outer window and the inner window is important, the bigger the gap the better the performance. It is recommended that the gap between the outer window and the inner window should be minimum 150mm.

The windows frames for inner and outer components of the glazing will need to have effective acoustic seals all round. Effective seals are rubber or neoprene beaded “P” type that compresses all around on closure of the windows. Plastic or brush type weathering seals are not classed as effective acoustic seals.

Note that it would also be possible to use secondary glazing complete units as supplied by some glazing suppliers (i.e. for fitment directly into window openings) rather than formed by separate outer and inner glazing elements as described above. As example, for a recent residential project we have been involved on, glazing supplier idealcombi were able to offer secondary glazing complete units that would comply with the specification details in Table 2.

4.3 Ventilation

The development is proposed to have mechanical ventilation as opposed to normal passive type ventilation. It is understood this is a requirement of Reading Borough Council principally for air quality reasons. The requirement to use mechanical ventilation will also assist mitigation of potential noise from Face Bar as the apertures serving the ventilation system can be positioned away from Face Bar.

It is therefore recommended that ventilation apertures be located to the western (side) elevation of the building or at roof level as opposed to the rear elevation or eastern (side) elevation.

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For mechanical ventilation then the acoustic specification for the ventilation system is that self-noise of the system must not cause internal noise levels within the rooms of the flats to exceed the noise limit requirements.

To achieve the requirements it is recommended that noise from any mechanical ventilation systems will need to be at least 5dBA lower than the requirements to allow for accumulation of noise sources.

Therefore it is recommended that the acoustic specification of overall self-noise from the mechanical ventilation system will need to be no higher than around L_{Aeq} 25dB for living rooms and also for bedrooms.

4.4 Roof and Ceilings

Roof/ceilings above the new roof extension flats are proposed to be formed by a composite insulated timber frame structure with a layer of plywood and a waterproof membrane finish. It is recommended that ceilings below roof level be upgraded to double layer 2 x 12.5mm SoundBloc (or equivalent) type plasterboard with minimum 100mm mineral wool type insulation laid over.

Values in Table 3 show the expected sound insulation performance for this type of composite roof structure. For this development where there is natural screening from low level noise sources associated with Face Bar (and from road traffic) to the high level roof then this roof construction will provide more than adequate sound insulation.

Description	Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Composite roof structure (includes insulated double layer SoundBloc plasterboard ceilings) Sound Insulation Performance R (dB)	29	31	42	48	55	*60	*60

** Note: SI values limited to upper values 60dB. Higher figures might be obtained at these frequencies but are not quoted.*

Table 3: Roof structure sound insulation performance Sound Reduction Index R dB

5. Discussion

The supplementary noise surveys show that noise levels associated with Face Bar and affecting the site can potentially be higher than the noise levels measured during previous surveys and therefore it is considered Reading Borough Council had reasonable grounds for requesting the extra noise surveys be undertaken. As consequence of this, the scheme for noise mitigation measures has now been upgraded to provide further protection against the potential higher noise levels associated with Face Bar.

Notwithstanding this, it remains a fact that for the majority of the time including on some Friday and Saturday nights, noise associated with Face Bar (as measured during the previous noise surveys and also as measured on Friday 6th December 2013) is below the higher noise levels measured on Saturday 7th December 2013 and for which the upgraded noise mitigation is based. This means that for the vast majority of the time the specified upgraded noise mitigation is not needed and will significantly overprotect the proposed new dwellings.

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Whilst it is accepted that even for nights when Face Bar is open but not busy there remains potential for customers external to Face Bar to generate high noise levels (i.e. as those measured on Saturday 7th December 2013) and little can be practicably done to reduce this noise at source (hence the upgraded noise mitigation), music noise breakout from Face Bar is a different and separate issue.

Music noise breakout from Face Bar during the supplementary noise survey on Saturday 7th December 2013 was noted to be higher than for Friday 6th December 2013 and for any of the previous surveys including on Saturdays.

It is expected that the music breakout as occurred on Saturday 7th December 2013 be at a level that would almost certainly cause disturbance to residents of existing older properties in the vicinity with normal/standard glazing and without benefit of very high performance secondary glazing as now proposed for this development.

We did not go inside Face Bar during any of the supplementary noise surveys and therefore we have not measured music volumes inside Face Bar. However, based on the measured and observed music noise breakout during the survey on Saturday 7th December 2013 it is very likely that if Reading Borough Council has noise limits in place for Face Bar as part of licensing to protect residents of existing properties in the vicinity, then I would expect it very likely that those noise limits were exceeded on Saturday 7th December 2013.

Yours Sincerely,



David R Philip BEng (Hons) MIOA
Director

Enclosure 1: Block Plan Layout Drawing (1 page)

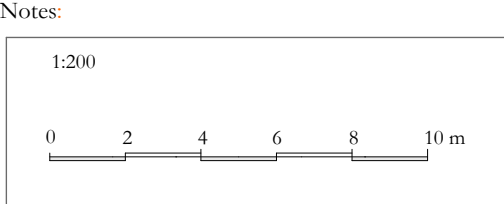
Enclosure 2: Noise Survey Instrumentation (1 page)

Enclosure 3: Noise Survey Results (2 pages)

Enclosure 4: Building Envelope Acoustic Calculations (3 pages)

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All dimensions to be checked on site and any discrepancies to be reported before work commences.



Proposed
Site Area
Red line: 1,135,2339 m2
Building: 665,789 m2
6 Parking Spaces
14 Bin Store
5 Cycle stand for 8 Bikes
4 visitors' cycle parking

Rev	Comment	By	Date
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THE
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Client:
Zain Reading Ltd.

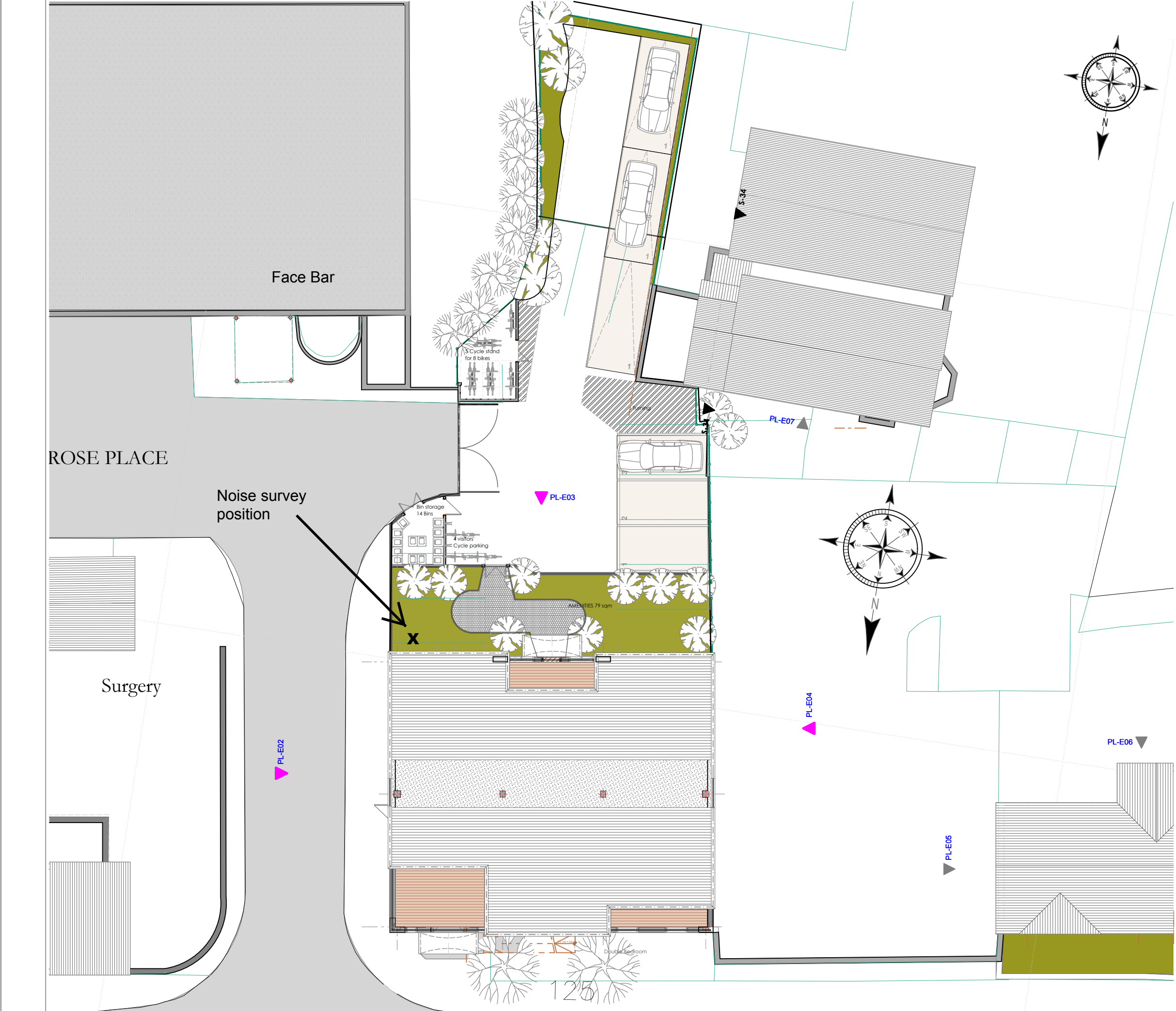
Job Title:
125 Chatham Street, Reading
RG1 7HT

Drawing Title:
Proposed Block Plan

Status:
PLANNING

Date Drawn: 06-06-13	Drawn By: LL	Scale: 1:200@A3
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Job No: 8415-13	Drg No: 8415-PL-06	Rev:
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Site: 125 Chatham Street, Reading, Berkshire RG1 7JG

Reference: 13169-004 ENCLOSURE 2

Date: January 2014

NOISE SURVEY INSTRUMENTATION

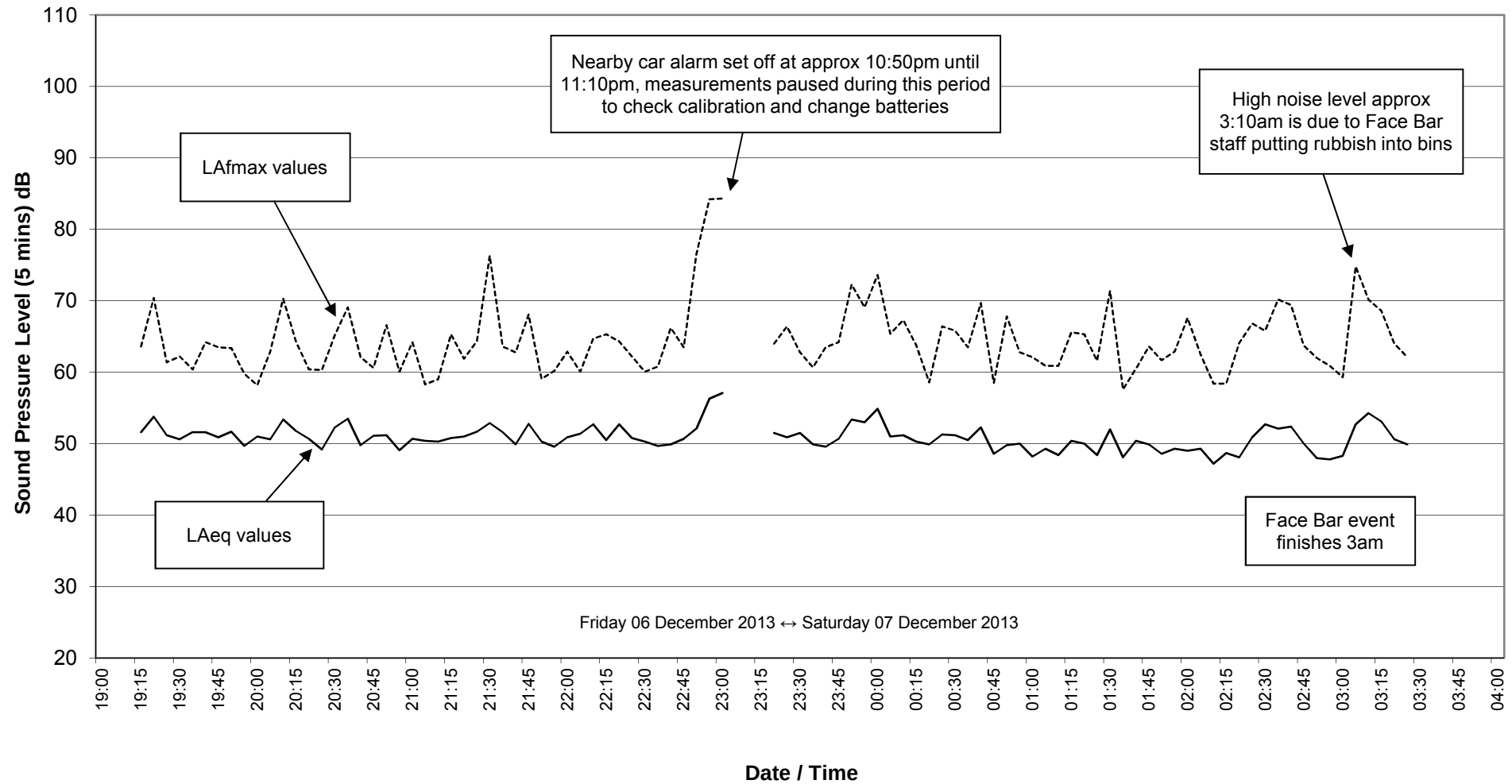
Logged Overall dBA Levels:

- Rion sound level meter type NL-31 Class 1 serial number 01193690 plus Rion microphone type UC-53A serial number 317534 complete with weatherproof outdoor environmental kit, microphone extension lead and extension boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929 (UKAS certified).

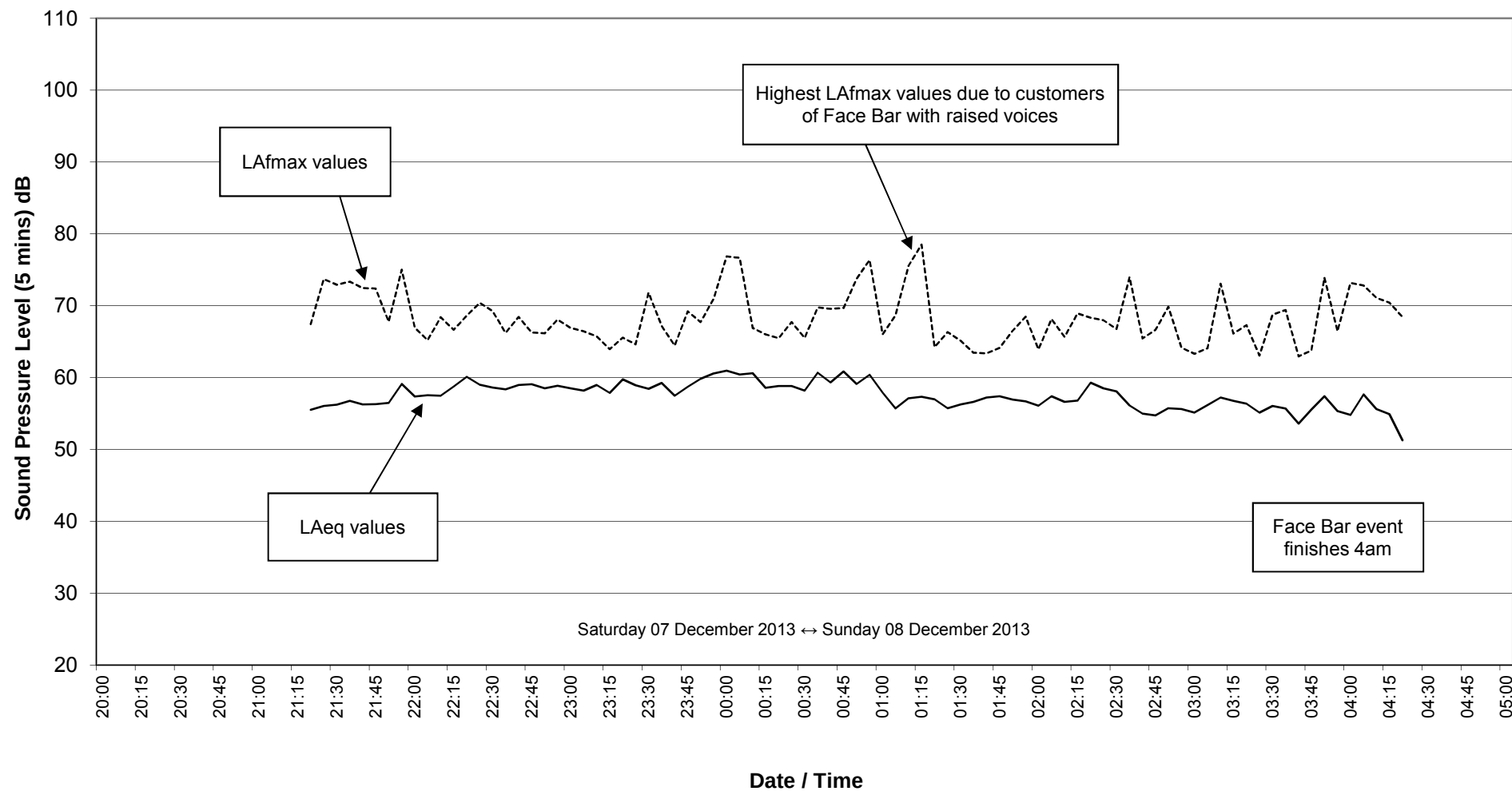
Octave Band Levels:

- Bruel & Kjaer sound level meter type 2260 Class 1 serial number 2627604 plus Bruel & Kjaer microphone type 4189 serial number 2625249 complete with weatherproof outdoor environmental kit, microphone extension lead and extension boom arrangement;
- Bruel & Kjaer calibrator type 4231 serial number 2642929 (UKAS certified).

RAW DATA NOISE SURVEY RESULTS 125 CHATHAM STREET, READING RG1 7JG
SUPPLEMENTARY NOISE SURVEY FRIDAY 06 DECEMBER 2013



RAW DATA NOISE SURVEY RESULTS 125 CHATHAM STREET, READING RG1 7JG
SUPPLEMENTARY NOISE SURVEY SATURDAY 07 DECEMBER 2013



Site: 125 Chatham Street, Reading, Berkshire RG1 7JG

Reference: 13169-004 ENCLOSURE 4 (Page 1 of 3)

Date: January 2014

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM: Flat 4 Living Room (rear façade towards Face Bar)

NOISE CONDITION: Highest $L_{Aeq(1hr)}$ 60dB (57dB Equivalent Free-Field Level)

Equivalent Free-Field External Sound Pressure Level Outside Sample Room :								
Highest sample Leq(1hr)	Overall dBA	Linear dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	57	76	68	54	52	49	45	39
Building Envelope Details For Sample Room :								
Element	Area (m²) or Vent No	Element Specification / Description						
Walls	18.2	Traditional Brick and Block Cavity Wall						
Window s	5.8	All window s to room very high performance secondary glazing ≥ Rw 47dB						
Doors	0	No external doors to room						
Roof / Ceiling	0	None to ground floor living room						
Ventilators	0	No passive ventilators, mechanical system proposed						
Element Sound Reduction Index:								
Element	Area (m²) or Vent No	dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	18.2	39	41	45	50	55	58	60
Window s	5.8	27	29	35	45	50	50	50
Doors	0							
Roof / Ceiling	0							
Ventilators (Dn,e)	0							
Overall Sound Reduction All Elements Combined		-32.4	-34.4	-40.0	-48.2	-53.2	-54.4	-55.0
Sample Room Volume (m³):		60						
Sample Room Building Envelope Surface Area (m²):		24						
Sample Room Characteristics:								
		Reverberation Time (seconds) at Octave Band Centre Frequency						
Sample Room Type:	Living Space	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.40	0.40	0.40	0.35	0.30	0.30	0.30
Calculated Internal Sound Pressure Level In Sample Room :								
Highest sample Leq(1hr)	Overall dBA	Linear dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	23.8	46.6	36.6	17.0	6.2	-2.4	-7.7	-14.2

Calculated Internal Sound Pressure Level Into Sample Living Room <NR20 $L_{Aeq}(1 hr)$

Site: 125 Chatham Street, Reading, Berkshire RG1 7JG

Reference: 13169-004 ENCLOSURE 4 (Page 2 of 3)

Date: January 2014

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM: Flat 4 Bedroom (rear façade towards Face Bar)

NOISE CONDITION: Highest $L_{Aeq(1hr)}$ 60dB (57dB Equivalent Free-Field Level)

Equivalent Free-Field External Sound Pressure Level Outside Sample Room :								
Highest sample Leq(1hr)	Overall dBA	Linear dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,ff	57	76	68	54	52	49	45	39
Building Envelope Details For Sample Room :								
Element	Area (m²) or Vent No	Element Specification / Description						
Walls	4.7	Traditional Brick and Block Cavity Wall						
Window s	1.8	All w indow s to room very high performance secondary glazing ≥ Rw 47dB						
Doors	0	No external doors to room						
Roof / Ceiling	0	None to ground floor living room						
Ventilators	0	No passive ventilators, mechanical system proposed						
Element Sound Reduction Index:								
Element	Area (m²) or Vent No	dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	4.7	39	41	45	50	55	58	60
Window s	1.8	27	29	35	45	50	50	50
Doors	0							
Roof / Ceiling	0							
Ventilators (Dn,e)	0							
Overall Sound Reduction All Elements Combined		-31.9	-33.9	-39.6	-48.0	-53.0	-54.1	-54.6
Sample Room Volume (m³):		28						
Sample Room Building Envelope Surface Area (m²):		6.5						
Sample Room Characteristics:								
		Reverberation Time (seconds) at Octave Band Centre Frequency						
Sample Room Type:	Bedroom	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.30	0.25	0.20	0.20	0.20	0.20
Calculated Internal Sound Pressure Level In Sample Room :								
Highest sample Leq(1hr)	Overall dBA	Linear dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Leq,2	20.6	43.5	33.5	13.0	1.7	-6.3	-11.4	-17.9

Calculated Internal Sound Pressure Level Into Sample Bedroom <NR15 $L_{Aeq}(1 hr)$

Site: 125 Chatham Street, Reading, Berkshire RG1 7JG

Reference: 13169-004 ENCLOSURE 4 (Page 3 of 3)

Date: January 2014

BS EN ISO 12354-3 BUILDING ENVELOPE SOUND INSULATION CALCULATION

SAMPLE ROOM: Flat 4 Bedroom (rear façade towards Face Bar)

NOISE CONDITION: Typical highest $L_{A_{fmax}}$ 76dB (79dB Equivalent Free-Field Level)

Equivalent Free-Field External Sound Pressure Level Outside Sample Room :								
Highest sample Lfmax	Overall dBA	Linear dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Lfmax,ff	76	83	73	62	70	73	69	60
Building Envelope Details For Sample Room :								
Element	Area (m²) or Vent No	Element Specification / Description						
Walls	4.7	Traditional Brick and Block Cavity Wall						
Window s	1.8	All w indow s to room very high performance secondary glazing ≥ Rw 47dB						
Doors	0	No external doors to room						
Roof / Ceiling	0	None to ground floor living room						
Ventilators	0	No passive ventilators, mechanical system proposed						
Element Sound Reduction Index:								
		dB at Octave Band Centre Frequency						
Element	Area (m²) or Vent No	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Walls	4.7	39	41	45	50	55	58	60
Window s	1.8	27	29	35	45	50	50	50
Doors	0							
Roof / Ceiling	0							
Ventilators (Dn,e)	0							
Overall Sound Reduction All Elements Combined		-31.9	-33.9	-39.6	-48.0	-53.0	-54.1	-54.6
Sample Room Volume (m³):		28						
Sample Room Building Envelope Surface Area (m²):		6.5						
Sample Room Characteristics:								
		Reverberation Time (seconds) at Octave Band Centre Frequency						
Sample Room Type:	Bedroom	63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Reverberation Time In Furnished Sample Room		0.30	0.30	0.25	0.20	0.20	0.20	0.20
Calculated Internal Sound Pressure Level In Sample Room:								
Highest sample Lfmax	Overall dBA	Linear dB at Octave Band Centre Frequency						
		63 Hz	125 Hz	250 Hz	500 Hz	1k Hz	2k Hz	4k Hz
Lfmax,2	27.8	50.5	38.5	21.0	19.7	17.7	12.6	3.1

Calculated Internal Sound Pressure Level Into Sample Bedroom <NR20 $L_{A_{fmax}}$