



1 WOLSEY ROAD
CAVERSHAM RG4

EXTERNAL BUILDING
FABRIC ASSESSMENT

REPORT 6817/EBF

Prepared: 25 August 2015

Revision Number: 0

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RG4 8DD

External Building Fabric Assessment



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Contents

1.0 INTRODUCTION 1

2.0 ENVIRONMENTAL NOISE SURVEY..... 1

3.0 EXTERNAL BUILDING FABRIC CRITERIA 3

4.0 EXTERNAL BUILDING FABRIC ASSESSMENT 5

5.0 CONCLUSION 8

1.0 INTRODUCTION

It is proposed that the site located at 1 Wolsey Road, Caversham is re-developed. The proposal is for erection of a single building containing 8 flats: 1No. three-bedroom duplex, 2No. two-bedroom and 5No. one-bedroom flats.

The site is immediately adjacent to Gosbrook Road to the north and Wolsey Road to the east.

An assessment has been carried out in relation to the noise levels likely to be incident on the proposed building façades to demonstrate that noise will not unduly affect the future occupants of the development.

This report details the results of the noise survey and sets out the acoustic performance requirements of the external building fabric elements.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Survey Methodology

(a) General

RBA Acoustics carried out a 24 hour noise survey between Tuesday 11th August and Wednesday 12th August 2015 in order to determine the corresponding noise levels over typical day and night-time periods. Measurements were made of the L_{Aeq} , L_{A90} and L_{Amax} noise levels.

(b) Measurement Position

Corner of Gosbrook Road and Wolsey Road, Caversham

A microphone was positioned on a pole approximately 4m high overlooking Gosbrook Road.

The measurement positions are also shown on the attached Site Plan 6931/SP1 and Photograph 6931/P1.

The measurement position is considered to be representative of worst-case noise levels incident on the proposed residential aspects of the re-development.

(c) Instrumentation

The following instrumentation was used for the survey:

Table 6817/T1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1405945	473728477	20 March 2016
Norsonic Pre Amplifier	1209	15800		
Norsonic ½" Microphone	1225	208218		
Norsonic Sound Calibrator	1251	34057	CAL 022-2014-4463	26 March 2016

2.2 Site Conditions

Since the measurements were unattended it is not possible to comment upon the noise climate over the entire monitoring period with absolute certainty. However, during our time on site it was noted that noise levels at the measurement position were affected predominantly by road traffic movements along Gosbrook Road running the length of the northern boundary of the site. Gosbrook Road was noted to be busy with constant traffic movements of moderate speed. Accelerating and braking noise was prominent due to the roundabout located at the end of the road approximately 75m from the site.

The road traffic on Gosbrook Road was noted to consist of all types of vehicle and also a local bus route stopping nearby. The buses and large commercial vehicles are likely to provide the maximum noise levels to the general noise climate at this position.

The road traffic on Wolsey Road was noted to be quieter and primarily consisted of low-speed car movement.

2.3 Results

The measured L_{Aeq} , L_{A90} and L_{Amax} 15 minute period levels are shown as time-histories on the attached Graphs 6817/G1 and 6817/G1. The averaged daytime and night-time L_{Aeq} noise levels are summarised in the following Table 6817/T2 below.

Table 6817/T2 – Measured L_{Aeq} and L_{Amax} Noise Levels

Measurement Position	Average $L_{Aeq, period}$ Noise Level (dB)		Range of L_{Amax} noise levels (dB)
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	Night-time (23:00 – 07:00 hours)
Gosbrook Road (north facing)	65	57	45 – 79

3.0 EXTERNAL BUILDING FABRIC CRITERIA

This section outlines the assessment criteria we anticipate the Local Authority will require in terms of the relevant standards. A brief explanation of the acoustic terminology used in this report is shown within Appendix A.

3.1 Planning Condition 6

Planning Condition 6 of Reading Borough council (ref. 140260) states:

“No development shall commence until a detailed scheme, informed by an assessment of the current noise environment, for protection of the residential dwellings from the external noise environment of the area has been submitted to and approved, in writing, by the Local Planning Authority. The scheme itself shall be designed, specified and constructed so that the sound insulation performance of the structure and the layout of the dwellings is such that the indoor ambient noise levels do not exceed the ‘good’ values as detailed in Table 5 of BS 8233:1999.”

Please note: BS 8233:1999 has recently been updated and reference in this report is therefore made to the current version of the standard.

3.2 British Standard 8233:2014

BS 8233:2014 “Guidance on *Sound insulation and noise reduction for buildings*” draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions.

The noise level values given are in terms of an average (L_{Aeq}) level.

The standard advises the following internal ambient noise levels for achieving suitable resting and sleeping conditions within residential properties. A brief explanation of the acoustic terminology used in this report is shown in Appendix A attached.

Table 6817/T3 – BS 8233:2014 Residential Criteria

Room	Daytime (07:00 to 23:00 hours)	Night-time (23:00 to 07:00 hours)
Living Rooms	35 dB $L_{Aeq,16hour}$	--
Dining Room/area	40 dB $L_{Aeq,16hour}$	--
Bedrooms	35dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.3 World Health Organisation: Guidelines for Community Noise

The document describes guideline levels that are “*essentially values for the onset of health effects from noise exposure*”.

A table of guideline values is included, relating to adverse health effects, referred to as any temporary or long term deterioration in physical, psychological, or social functioning that is associated with noise exposure.

The following is an extract from *Table 4.1: Guideline values for community noise in specific environments*, as stated in the document.

Table 6817/T4 – Guideline Values for Community Noise

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hours)	$L_{Amax,f}$ (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-times	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

With reference to maximum noise levels the following guidance is provided within the WHO guidance:

“For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991) and most studies show an increase in the percentage of awakenings at SEL values of 55-60 dBA (Passchier-Vermeer 1993; Finegold et al. 1994; Pearsons et al. 1995). For intermittent events that approximate aircraft noise, with an effective duration of 10-30s, SEL values of 55-60 corresponds to a L_{Amax} value of 45dB. Ten to 15 of these events during an 8 hour night-time implies a $L_{Aeq, 8h}$ of 20-25dB. This is 10-15dB below the $L_{Aeq, 8h}$ or 30dB for continuous night-time noise exposure, and shows that intermittent character of noise must be taken into account when setting night-time noise limits for noise exposure. For example, this can be achieved by considering the number of noise events and the difference between the maximum sound pressure level and the background of these events.”

Therefore the frequency of occurrence of maximum noise events should not typically exceed 10-15 times in any night.

3.4 Summary

The project criteria adopted are therefore as follows;

Bedrooms	Daytime (07:00-23:00 hours)	35dB L_{Aeq}
	Night-time (23:00-07:00 hours)	30dB L_{Aeq}
Living Rooms		45dB $L_{Amax,f}$ (typical)
	Daytime (07:00-23:00 hours)	35dB L_{Aeq}

4.0 EXTERNAL BUILDING FABRIC ASSESSMENT

4.1 Background

Analyses of the external building fabric have been undertaken in order to ascertain the required acoustic performance of the glazing and other external fabric elements to achieve the project criteria.

4.2 Assumptions

Our external building fabric analyses have assumed the following:

(a) Drawings

Our assessment has been based on the following Iconic Architecture drawings.

Drawing Number	Description	Revision	Date
3138 / 10	Ground Floor Plan	-	07/2014
3138 / 11	Setting Out Plan	-	07/2014
3138 / 12	First Floor Plan	-	10/2014
3138 / 13	Second Floor Plan	-	10/2014
3138 / 14	Sections	-	10/2014
3138 / 15	Elevations	-	01/2015

(b) Noise Levels

The assessment has been based on the measured noise levels as detailed in Section 2.3.

(c) Room Absorption

We have assumed the bedrooms to be acoustically “soft” with carpets, curtains and other soft furnishings. For the purposes of our analyses we have assumed the following absorption coefficients.

Table 6817/T5 – Bedroom Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.25	0.27	0.31	0.32	0.32	0.32

We have assumed the living rooms to be less acoustically absorptive (with a hard floor finish, although with furnishings). For the purposes of our analyses we have assumed the following absorption coefficients.

Table 6817/T6 – Living Room Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.20	0.22	0.22	0.22	0.23	0.27

(d) External Wall

We understand that external non-glazed areas are to comprise the following:

- 13mm plaster
- 100mm plaster
- 100mm Plasmore Stranlite or 100mm Durox Supabloc
- 100mm Dritherm insulation
- 103mm brickwork

As such, we have assumed the following sound reduction indices (equating to an overall R_w of 52dB) for all non-glazed façade areas comprising the above construction:

Table 6817/T7 – Non-Glazed SRIs

Assumed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R_w (dB)
63	125	250	500	1k	2k	4k	8k	
36.0	41.0	45.0	45.0	54.0	58.0	58.0	58.0	52.0

Should the proposals for non-glazed areas change, it is critical we are informed at the earliest opportunity as this could have a significant impact on the sound insulation performance requirements of the glazing systems.

(e) Ventilation

It is understood the chosen strategy is natural ventilation via trickle ventilators. These have also been assessed and the acoustic performance specification for such trickle ventilators is detailed below.

It should be noted the trickle ventilators also provide background trickle ventilation only and that windows are to generally be openable to provide rapid ventilation. During those periods where windows are opened for purge/rapid ventilation, noise levels will naturally be increased internally.

4.3 Specification & Guidance Constructions

Appendix B (attached) details the sound reduction performance specification for the ventilators and glazed elements of the external building fabric.

The glazing performance specifications apply to the glazing package as a whole inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seals, etc. The performance of the glazing system will depend on many factors such as the glazing configuration, size of window panels, quality of framing, quality of sealing, etc.

For guidance purposes we would typically expect the following glazing configurations detailed below to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix B.

Please note: The overall sound insulation performance is a combination of noise transfer through the glazing and ventilators. Revisions to the background ventilators in order to provide greater acoustic performance may allow glazing specifications to be reduced. RBA Acoustics would be pleased to advise and revise glazing guidance constructions accordingly should a decision be made to do this.

Please note – The glazing configurations described in Table 6817/T8 and ventilator types described in Table 6817/T9 are given for costing purposes only. All window systems should be capable of meeting the performance specifications shown in Appendix B, with laboratory test certificates being made available in support of the quoted performance. Glazing proposals which simply reflect the guidance constructions indicated in this report will not, in isolation, be sufficient evidence that a window configuration will meet the performance specification.

Table 6817/T8 – Glazing Guidance Constructions

Glazing Type	Glazing Configuration
G1	High specification double glazing with differing pane thicknesses, e.g. 10mm Glass / 12mm Cavity / 6.4mm Laminated Glass
G2	Low specification double glazing with differing pane thicknesses, e.g. 4mm glass / 12mm cavity / 6mm glass

For guidance purposes we would typically expect the following trickle ventilator types to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix B.

Table 6817/T9 – Guidance Trickle Ventilator Types

Ventilator Type	Example Ventilator Type
V1	Trickle Vent with Direct Air-Path (4000mm ²)
V2	Any standard “through-the-frame” type trickle ventilator

4.4 Applicable Zoning

Due to the different rooms types at each floor level, two primary glazing zones have been defined. These are indicated on the attached Façade Zoning Plans 6932/FZPG and 6932/FZP1.

(i)	Zone 1	–	Glazing Type:	G1
			Ventilator Type:	V1
(ii)	Zone 2	–	Glazing Type:	G2
			Ventilator Type:	V2

5.0 CONCLUSION

RBA Acoustics have undertaken noise monitoring at the proposed development site at 1 Wolsey Road, Caversham, RG4. The measured noise levels are presented herein. The resultant noise levels have been used in our assessment of the glazing and ventilator requirements to ensure suitable internal noise levels are achieved at the proposed development with reference to BS 8233, WHO and Planning Condition 6.

General guidance configurations have been suggested for the glazing constructions that should be capable of achieving the required specifications detailed within Appendix B. Trickle ventilators have also been assessed and specified herein. As such it has been demonstrated that Planning Condition 6 can be satisfied.

Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10} , L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.

Appendix B – External Building Fabric Acoustic Specification

1.0 Window Sound Insulation Performance

Glazed units (inclusive of glazing, louvres, timber panels, spandrel panels, infill panels, framing, opening lights, balcony/terrace doors, seals, etc. as appropriate) should achieve the following minimum sound reduction indices as tested in general accordance with BS EN ISO 10140-2:2010:

Type	Minimum Recommended Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								R _w (dB)
	63	125	250	500	1k	2k	4k	8k	
G1	27	30	26	34	41	46	53	53	39
G2	19	23	22	27	38	40	41	41	33

Note: R_w is the “overall weighted sound reduction index” tested in a laboratory.

N.B. as the internal noise criteria are expressed in dBA terms, other frequency specific performance levels may ultimately prove acoustically acceptable. Test data for representative samples of all glazing systems shall be submitted to RBA Acoustics for approval to demonstrate compliance with the above performance specifications.

2.0 Trickle Ventilator Sound Insulation Performance

Trickle ventilators (in their open state) should achieve the following minimum element-normalised level differences as tested in accordance with BS EN 20140-10:1992:

Type	Minimum Recommended D _{n,e} (dB) at Octave Band Centre Frequency (Hz)								D _{n,e,w} (dB)
	63	125	250	500	1k	2k	4k	8k	
V1	31	35	35	34	36	34	34	34	35
V2	22	28	31	34	34	31	31	31	33

Note: D_{n,e,w} is the “overall weighted element normalised level difference” tested in a laboratory.

Please note the above specification(s) assumes one trickle ventilator will be installed per room. The specification(s) should be increased by a factor of 10Log(N) should N ventilators be required per room, i.e. increase by +3dB or +5dB respectively should two or three ventilators be required per room.

N.B. as the internal noise criteria are expressed in dBA terms, other frequency specific performance levels may ultimately prove acoustically acceptable. Test data for the trickle vents in their open state shall be submitted to RBA Acoustics for approval.

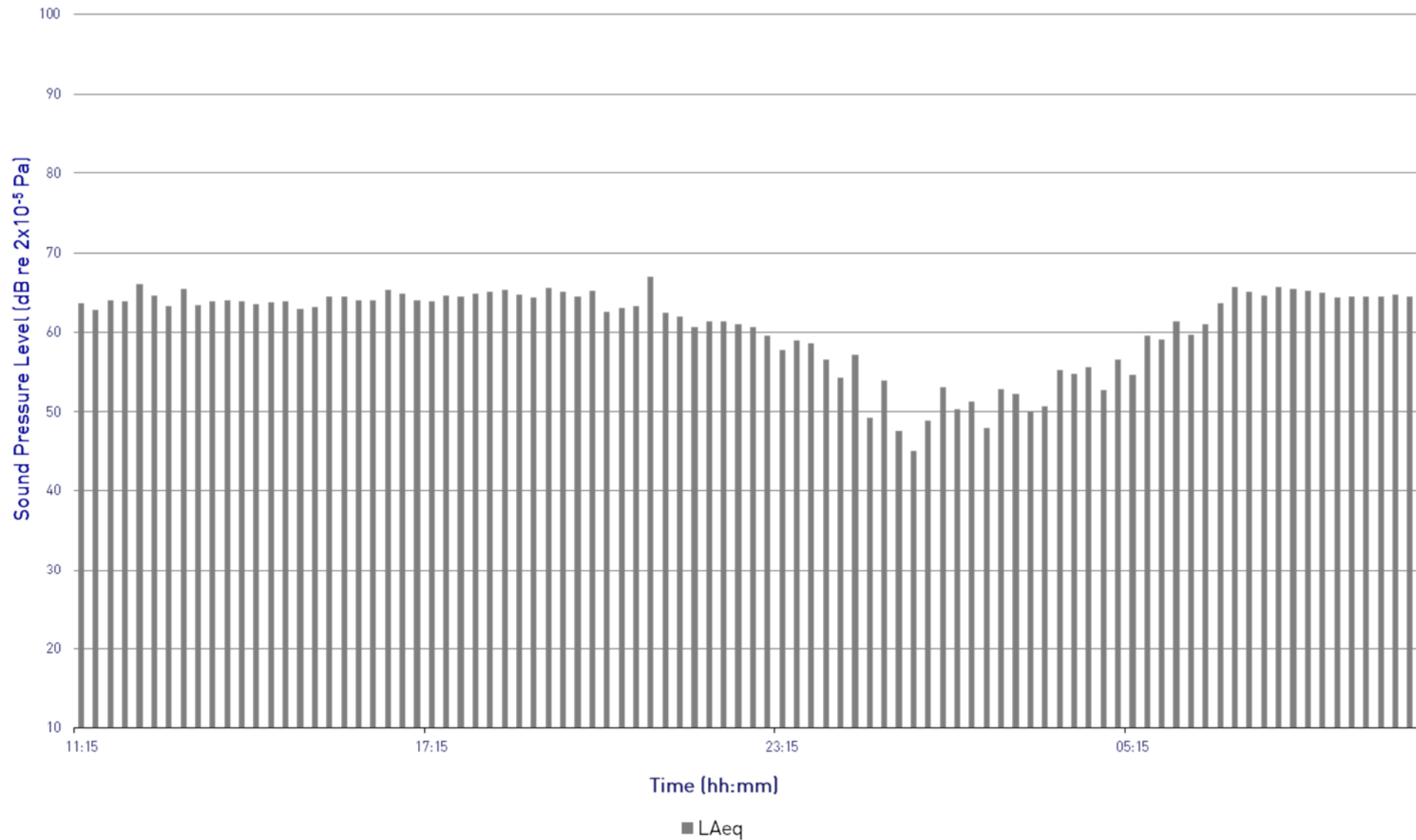
1 Wolsey Road, Caversham

L_{Aeq} Time History

Tuesday 11th August to Wednesday 12th August 2015



Graph 6817/G1



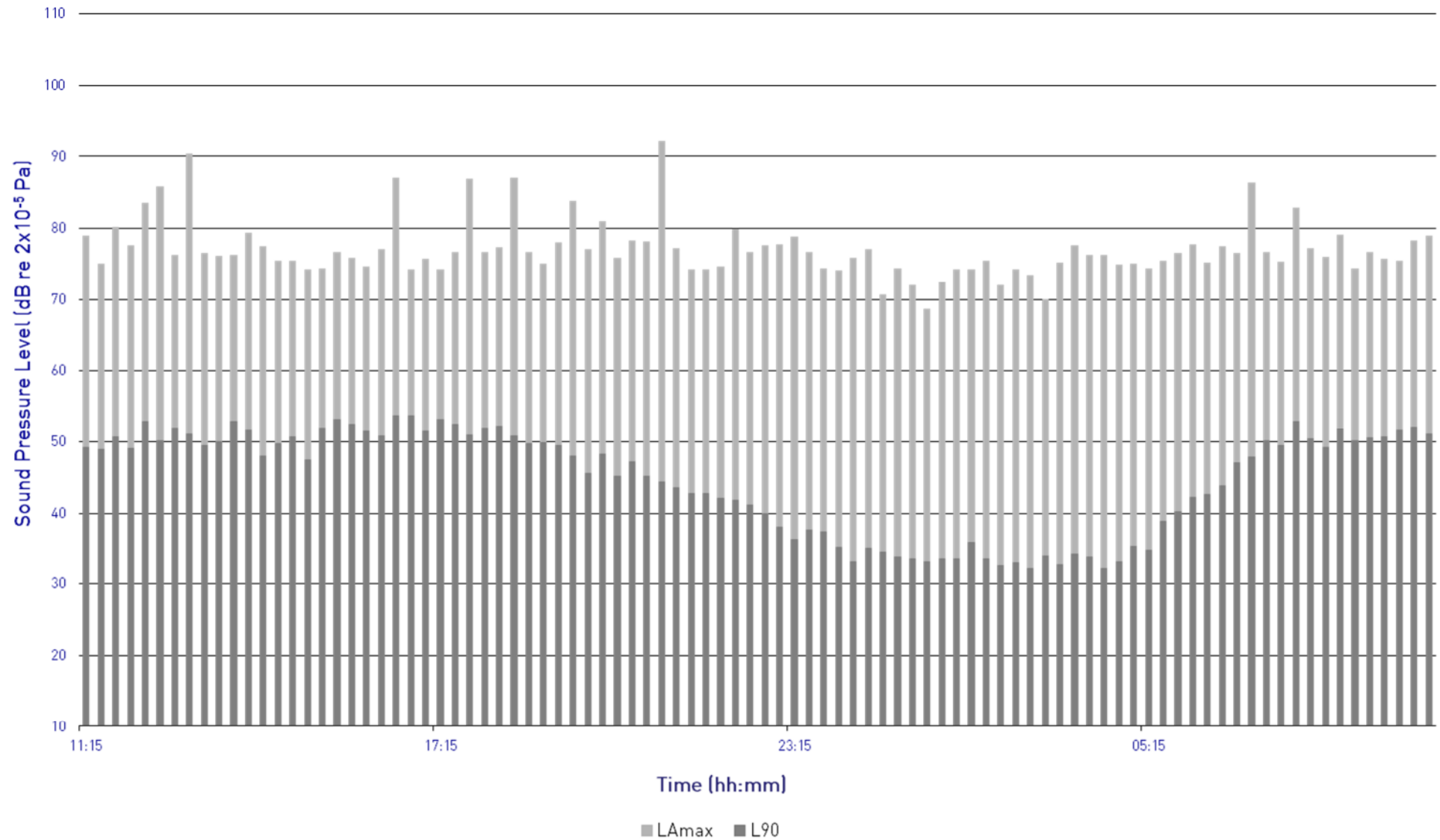
1 Wolsey Road, Caversham

L_{Amax} and L_{A90} Time History

Tuesday 11th August to Wednesday 12th August 2015



Graph 6817/G2

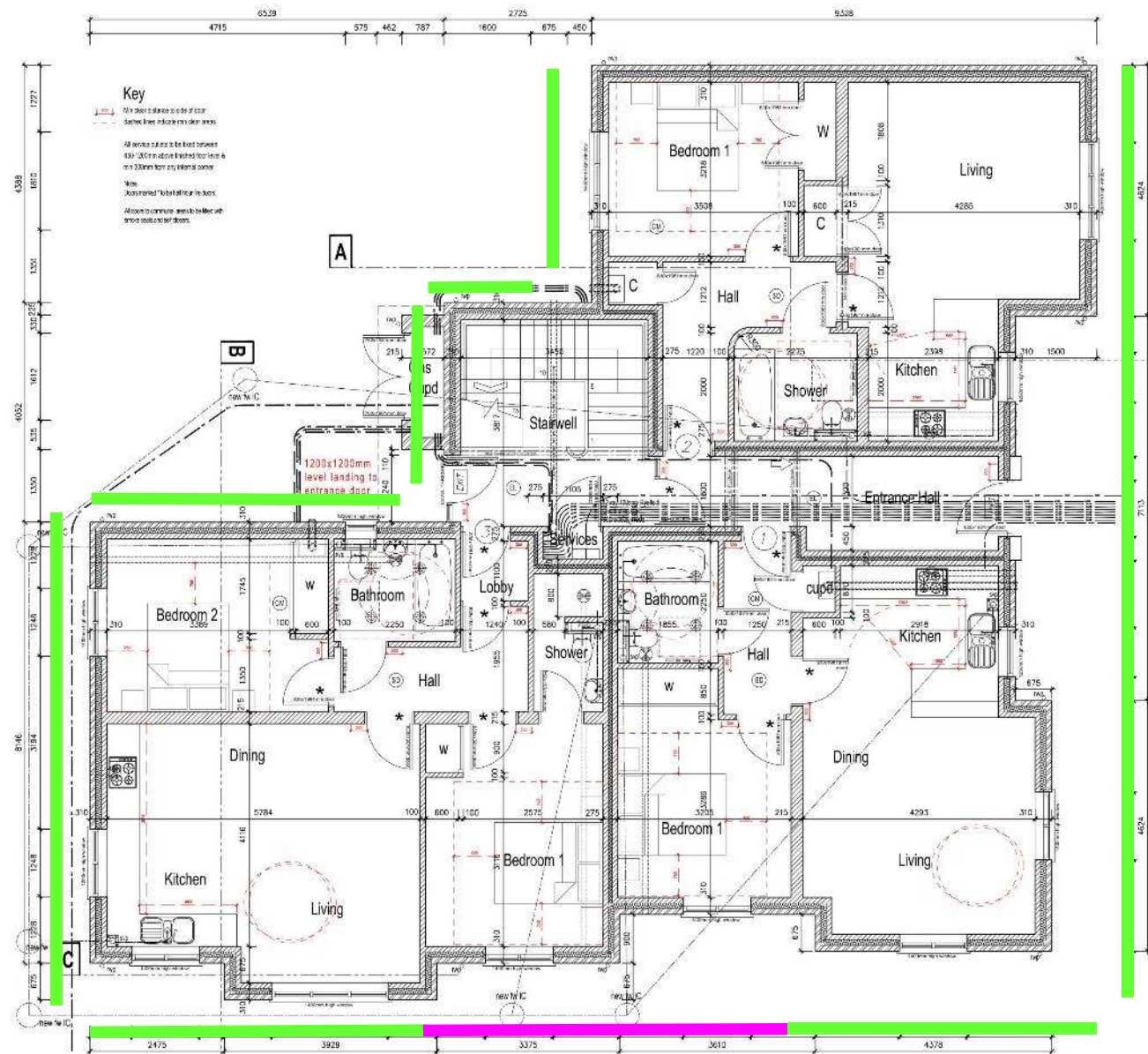




1 WOLSEY ROAD, CAVERSHAM, RG4
Site Plan showing Measurement Position

Site Plan 6817/SP1
21 August 2015
Not to Scale





1 WOLSEY ROAD, CAVERSHAM, RG4

Façade Zoning Plan - Ground Floor

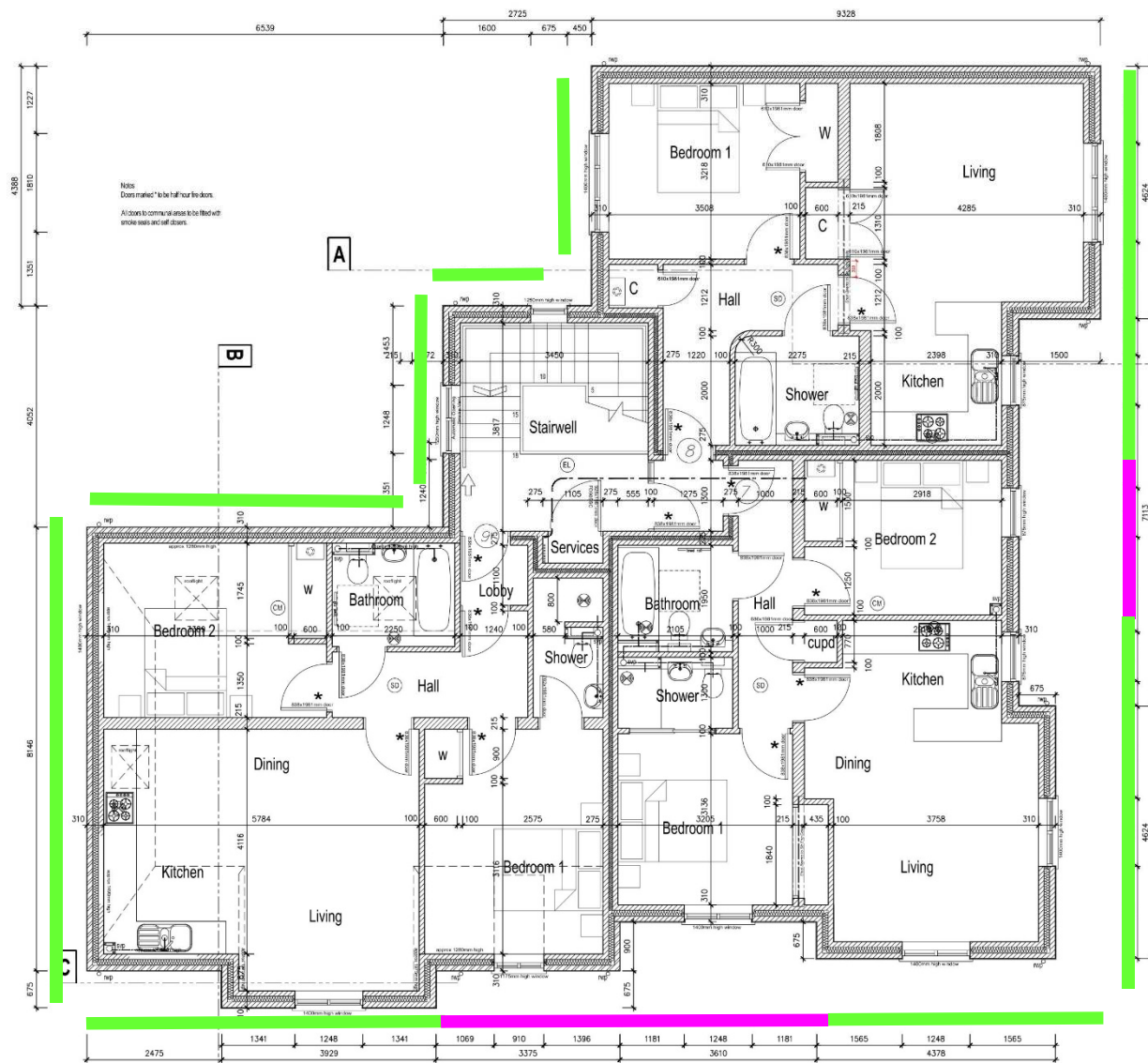
6817/FZPG

25 August 2015

Not to Scale



a



1 WOLSEY ROAD, CAVERSHAM, RG4

Façade Zoning Plan – First and Second Floors

6817/FZP1

25 August 2015

Not to Scale





1 WOLSEY ROAD, CAVERSHAM, RG4

Photograph detailing the measurement position

Measurement Position

6817/P1

25 August 2015



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